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HOW TO FIGURE COSTS IN A PRINTING OFFICE

R. T. PORTE

UC-NRLF



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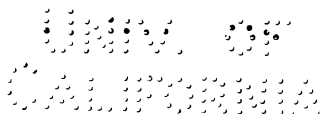


HOW TO FIGURE COSTS IN PRINTING OFFICES

By

ROY TREWIN PORTE

Author of "Practical Cost System
for Small Printers"



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PREFACE

There is no great claim on the part of the author that the ideas put forth in this volume are by any means original, nor are they all of his own. The main purpose and intent of writing what is given here is to put forward every point that is necessary for the figuring of a cost system according to the methods adopted by the devisers of the Standard Cost System, and other chargeable hour methods.

In the few years that I have been privileged to do Cost System work, I have felt the necessity of such a book as this for the cost clerk and printers, telling, not only how and why, but *showing* how.

Printers without cost systems have read a great deal of why they should put one in, but rarely how it was done. That there are not more cost systems is because printers gen-

erally did not fully understand the actual figuring out of a system, and thus hesitated. With this book, and an accurate time keeping system, there should be little difficulty in putting into operation a cost system.

There is always need of expert advice in installing a system, and by securing an expert to do the work, much better results are possible. Having thus put in a cost system, this book will be equally valuable to the figuring of the system, and for the use of the cost clerk.

The arrangement makes it possible to use the book for the purposes of classes on costs by organizations. The questions may be given out at the following session of the class, and should have written answers. This plan can also be used by the individual, and the answer compared with the explanation as given, thus being sure that every point is fully understood.

No doubt many points given will not be accepted as correct by readers. This was by no means unexpected. Some things explained are not the opinion of the author. However, this is not a book of just one system, but of the several

now in use, and while all are based on the one idea, often different methods are used and some propositions in those systems are utterly ignored and others used. The reader has here put before him the various methods, and he can easily figure out which is the best or most practical in his case, and ignore the others. But that is no reason why he should not have knowledge of all the methods.

The answers to questions in the last part of the volume take up any matters that could not be rightly treated in the cost system for the printing office alone, and also treat of exceptional propositions or ideas.

Although I have from literary necessity employed some positive statements, I am very far from laying claim that the last word has been said or that I am the only authority on the subject.

If I took such a position, I would place myself at the mercy of the reader, for he could, by refusing to see me as an authority, thus bring down the whole idea and argument like a stack of cards. The ideas and arguments, as well as ex-

amples, are those of many others, and I can merely lay claim as to providing them with form, and thus presenting them to the reader.

I bring forth the ideas and examples given, because they have commended themselves to me, as being the most logical, and practical for the purpose intended, as well as the best that are known at this time. There will be others at a later date.

In other words, I have set forth ideas and results—with examples—which have been reached after a long experience in cost system work and practice, and give them to you for your own consideration and use as you may see fit.

R. T. P.

1913

HOW TO FIGURE COSTS

I

FIGURING THE PAY ROLL

The first step away from all the old traditions of cost finding was the principle of charging direct to a productive center all of the pay roll used by labor in that center.

The Cost System as devised by the printers of America, is different from any of the other methods, in that the producing center rather than the individual becomes the unit of production. The Accountants' method of ascertaining costs was to obtain only labor costs (actual wages) add a percentage for "overhead," another for selling, and then a profit.

The productive center method (and I shall use this term to apply to all the printers' cost systems when they do not conflict) is to figure labor just as one element of cost, and to divide manufacturing plants into productive centers or units

of production, and ascertain the cost per hour of the unit.

The common term for productive center is "department," but this does not clearly express the writer's idea, and is discarded for that reason. The terms, however, are synonymous.

This is the efficient method, in that the material or machinery used creates the efficiency of the workman. Their efficiency can be fairly well measured.

To add more "overhead" to a high-priced workman than to a low-priced one, is unfair. High wages are paid employees because they need less supervision, not because they need more. When a man's wages are raised five cents an hour, you cannot say you should add ten cents more for supervision, or that he should stand for more rent, light, power, or what not, because of that increase.

Analyzing the proposition in the fullest, any percentage method based on price paid for labor, ends only in unreasonable comparisons, and was originally adopted only because no better method was then known. This method, of course, has been defended time and time again

—many “high authorities” have written able articles, but that was before the day of direct methods.

Today we think less of labor costs, and more of “efficiency costs,” which the productive center method, boiled down, really is.

The first item the cost clerk figures in the monthly Summary of Costs or Form 9-H, is the Department Pay Roll. Here, regardless of anything else, the entire pay roll of each employee is charged to each and every productive center in which he has worked.

The usual productive centers in a printing office are Composing Room, Cylinder Press, Job Press, Ruling Machines, Cutter, Men’s Machine, Men’s Handwork, Girls’ Machine and Girls’ Handwork. Many offices have additional productive centers, according to the nature of their work.

The wages of every employee who works in the composing room must be charged as a lump sum against that productive center, including galley boys, distributors, proof-readers, etc., and this applies just as well to all other productive centers.

HOW TO FIGURE COSTS

[illegible]

In many cases, however, an employee works in one or more productive centers in the same month. In that case, his salary must be divided and charged according to the hours he worked in the several centers. There are various methods of doing this, which will be described.

The Standard System provides a weekly (productive center) pay roll sheet. One of these is necessary for every center. If an employee works in more than one center, his name is entered on the different sheets.

This method sub-divides the pay roll, and the cost clerk can make up the pay roll according to each center. (See opposite page.)

Another method, brought out since the Standard was devised, is used to a great extent, as it keeps each individual separate instead of using productive center sheets. A sheet with divisions for six names is provided, with 31 lines on the sheet. Under each head are provided three box heads for three centers or departments, so that the day's work of an employee may be divided into three parts. The heading is printed herewith.

If, as it sometimes happens, an employee

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works in more than three productive centers, as many spaces may be used as are necessary.

The total number of hours used in each of the centers can be added up at the end of each month, the rate of wages per hour and total multiplied, and actual wages for each center can thus be ascertained.

EXAMPLE—Chas. Edmunds works in the bindery, and on cylinder and job presses. He works in all 224:30 hours in one month, of which he puts in 54:15 hours on the cylinder press, 112:45 hours on the job press, and 57:30 hours in the bindery. These amounts consist of both chargeable and non-chargeable time. Both divisions of time are treated alike in figuring the pay roll in every case.

Edmunds receives 40 cents per hour, or a total of \$89.80 for his month's work. His pay is figured thus:

Cylinder....	54:15 hours	
	.40 cents	
	<hr/>	
	21.60	
	.10	
	<hr/>	
	\$21.70	\$21.70

FIGURING THE PAY ROLL 7

Job Press . . . 112:45 hours
 .40 cents

44.80
 .30

\$45.10 \$45.10

Bindery 57:30 hours
 .40

22.80
 .20

\$23.00 \$23.00

Total for month \$89.80

There will be several employees of such centers and their salaries are added together making up the total pay roll for each of the centers.

The total pay roll cost of the various centers in the sample shown are as follows:

	<i>Comp.</i>	<i>Cyl. P.</i>	<i>Job. P.</i>	<i>Bind'y</i>
John Richards.	\$100.80			
Chas. Edmunds.		\$21.70	\$45.10	\$23.00
R. R. Hicks ..	107.38			
Totals . . .	\$208.18	\$21.70	\$45.10	\$23.00

This method of ascertaining the pay roll of each center can be followed whether with three employees or a thousand.

HOW TO FIGURE COSTS

EMPLOYEES PAY ROLL RECORD

Name of Employee				Name of Employee				Name of Employee			
JOHN RICHARDS				CHAS. EDMUNDS				R. R. HICKS			
Dept. Comp.	Dept.	Time	Time	Dept. Cyl.	Dept. Job P.	Dept. Bind.	Time	Dept. Comp.	Dept.	Time	Time
H	M	H	M	H	M	H	M	H	M	H	M
8 00				8 00				8 00			
8 00				5 00	3 00			8 00			
8 00					2 00	6 00		8 00			
8 00						8 00		7 30			
4 00					4 00			4 00			
224 00				45 15	112 45	57 30		214 45			
	.45				.40		.40				
100 80				21 70	45 10	23 00		107 38			

FIGURING THE PAY ROLL 9

A cut leaf pay roll book may also be used, writing in heads for each of the centers, with the employees sub-divided, and practically the same method used.

The method or manner does not count for so much as the *result*. Obtain this result, as long as it is accurate, in the simplest manner possible.

NOTE—Where an employee works regularly in a productive center, and is *occasionally* called to another, it is the usual rule to figure all except *that* portion of the employee's time against his *regular* department, unless the delay or non-productive time is occasioned by the other center, or in other words, non-productive time should generally be charged to his regular productive center.

QUESTIONS

1. *What is the difference between methods used by Accountants and the productive center methods?*
2. *What is a productive center?*
3. *Should more supervision be charged against a highly-paid man than a low paid man?*

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4. *What is included in the productive center pay roll?*
5. *What about an employee who works in more than one productive center?*
6. *How are his wages sub-divided?*
7. *Give an example of divided pay roll.*
8. *What is the difference between "department" and "productive center?"*

II

FIGURING BUILDING EXPENSE

Each productive center occupies more or less space, according to its needs. The cost of this floor space must be figured according to the space occupied by each productive center.

If the building occupied is owned by the concern which also owns the plant, a rental charge should be made for occupancy.

There are many errors made in figuring floor space, even by those who understand the problem, and they should be discussed before the actual examples are shown, in order to prove that there is only one correct method.

Let us consider first the proposition of the concern owning its own ground and buildings. Because it has money thus invested is no reason why it should not seek a legitimate return on that one thing alone.

The building was probably erected for the sole purpose of housing the plant and would cost con-

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siderable money to alter for another tenant. That alone should be considered as a factor. It would be unwise to take first the value of the land, the buildings, etc., figure the interest return, taxes, insurance, repairs and other items as a basis for figuring the rent. Location, rise in land values, possible changes in the building laws, depreciation of property, and many other things should be taken into consideration. The rental charge should be based solely on the value of the building for rental purposes, just as though the building were being rented by a second party.

Again, a tenant may be occupying part of the building (or several tenants) and the concern may figure that by this method it receives free rent. This is of course a fallacy; and even if such were the case, there is no good reason why a proportionate amount should not be charged for the space occupied, and reckoned as additional profit.

When a loft or building is rented, of course the rent must be taken into account. No argument can be brought against that, and even if the building is owned by the concern occupying

it, a liberal amount should be allowed for a rental charge on the space occupied.

Floor space is floor space, whether occupied by desks, cases, presses or ruling machines. Each is placed with a view to the greatest efficiency and practicability. It would show a lack of wisdom to locate the salesman's desk on the sixth floor rear. It would be equally foolish to put the stitchers just inside the entrance. Each has its proper place, but the floor space for each is equally valuable.

The fact that the office is located on the first floor right near the entrance does not enhance the value of its floor space per foot over that occupied by the job presses which are located farther away.

Every inch of floor space is of equal value to a plant, and to say that one loft is worth more than another is to ignore the fact that if conditions in regard to arrangement of the plant were reversed, there could be no re-adjustment with reference to value, of that floor space.

In figuring floor space by the productive center method, each center is charged with the floor space it occupies, and that only. The number

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of employees working in it, whether one or twenty, has no bearing upon this point. All the space is measured off and divided according to its use.

The best method of accomplishing this, is to prepare a floor plan or plat, showing the location of each machine in correct measurements. This will enable you, by the use of a ruler, to indicate the floor divisions, and figure out the square feet in each productive center. If this is not practicable, the space may be measured with a tape line, and the divisions of space between productive centers marked with chalk on the floor, so that overlapping will be avoided.

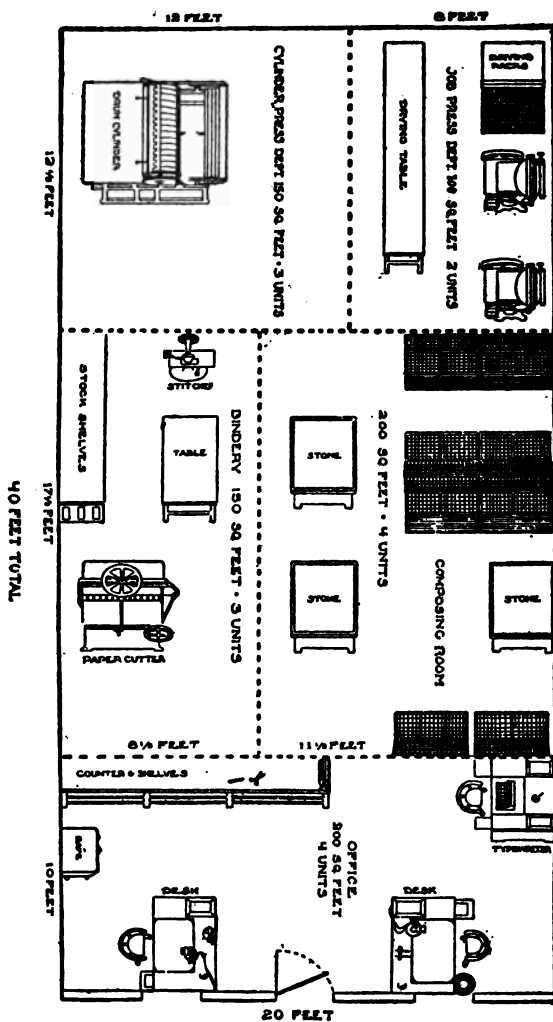
Where elevator service is not included in the rental, this space should be figured out, and a method for taking care of same will be described in a later chapter.

If one floor contains rest rooms, toilets, etc., this space must also be figured out, and a method for taking care of same will also be given later.

When you operate a heating plant, this space too, must be figured out. If heat is furnished by stoves, the space is always included in the productive center.

BUILDING EXPENSE

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VIEW TAKEN FROM THIS POINT

Allowance should be made on each floor for hallways, etc. If a floor contains more than one center, it should be figured out proportionately.

It is being taken for granted that you already have your shop divided into productive centers, and that you have arranged your time according to these centers. In measuring off your floor space, you should be careful to include in each productive center exactly the amount used in each center.

A diagram, or layout of a small printing office is made, in order to show the method of measuring off the floor space. While this is but a small shop, the principle involved may be applied to any size printing office.

The office occupies ten feet in the front part of the building; or 200 square feet of space. A dotted line shows the division line between the office floor space and that of the productive centers.

The composing room and bindery occupy the middle portion of the space, a distance of $17\frac{1}{2}$ feet back. The space between these two centers is shown as being equally divided by a dot-

ted line running between the stones and the table.

This is working space, and necessary to each; one half of the space is charged to the composing room, the other half to the bindery.

The composing room occupies a space $11\frac{1}{2} \times 17\frac{1}{2}$ feet, or nearly 200 square feet.

The bindery occupies a space $8\frac{1}{2} \times 17\frac{1}{2}$ feet, or nearly 150 square feet.

The press room occupies the back part of the floor space, and is divided between the job and cylinder presses, as each of these are separate productive centers. The division line is drawn a few feet from the drying table of the job presses. A cylinder press takes more room for stock, handling of forms, drying room, etc., and the working space has been charged to the productive centers according to the use as found in this case. Each center must have charged to it all the floor space it actually occupies or uses in order to produce.

The job press room is $8 \times 12\frac{1}{2}$ feet or 100 square feet.

The cylinder room is $12 \times 12\frac{1}{2}$ feet or 150 square feet.

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In order to use as few numbers as possible, and to get rid of useless small figures, the floor space occupied by the various productive centers, should be reduced to fifty-foot units. The problem is easy, and saves a great deal of time. When a space is 96 square feet, it should be counted as two units, 157 square feet as three units. Taking the floor space as described and given, it would figure in fifty-foot units as follows:

Office	200 sq. ft.	=	4 units
Composing	200 " "	=	4 units
Bindery	150 " "	=	3 units
Jobbers	100 " "	=	2 units
Cylinders	150 " "	=	3 units

Total16 units

Four elements enter into building expense. One is rent discussed above, the others are heat, janitor and repairs.

Where heat and repairs are included in the rent, these items do not need to be taken into account.

Heat should be figured on the same basis as rent, and if produced by local means, such as

stoves, is easy to figure. If a large heating plant is necessary, this item becomes more complicated. It should be figured on the basis of the value of the heating plant, the cost of coal, labor, cost of hauling away ashes and other incidental charges, as well as for the space it occupies. This problem will be shown later.

Janitor service should be charged against floor space. Repairs necessary to the proper up-keep of the building should also be considered. The four items must be figured separately, and totaled.

Example—Rent	\$15.00
Janitor	10.00
Heat	5.00
Repairs	2.00
	<hr/>
	\$32.00

The total amount of the four can then be divided by the sixteen fifty-foot units, to ascertain the cost per unit.

Example—	16)32.00(\$2.00
	32
	<hr/>
	00

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The units cost \$2.00 each for the four items and the different divisions of floor space are charged accordingly.

Example—Office	.....4 units	×	\$2.00	=	\$8.00
Composing	.....4 units	×	2.00	=	8.00
Bindery	.....3 units	×	2.00	=	6.00
Jobbers	.....2 units	×	2.00	=	4.00
Cylinder	.....3 units	×	2.00	=	6.00
					<hr/>
Total	.....				\$32.00

Each division of floor space is thus charged with the correct amount. It occupies the space, therefore, it must bear the burden of that cost.

QUESTIONS

1. *What is the correct way in which to charge floor space?*
2. *What is the correct way in which to figure rental of building occupied by the owner?*
3. *Suppose the owner does not occupy the entire building, but rents a portion out, how should the rental be figured?*
4. *Should the price of floor space be figured according to location? If so, why?*

5. *What is the best method of ascertaining the floor space occupied by a productive center?*
6. *What about the elevator and toilet room?*
7. *Where should working space be figured?*
8. *What is meant by square foot and how is it ascertained?*
9. *Why should one machine be charged with more floor space than another?*
10. *What is a fifty-foot unit?*
11. *What elements enter into building expense?*
12. *Give example of division of building expense by units.*

III

FIGURING THE INVENTORY

That money which a man has invested in a plant must bring him a suitable return in money, and must also provide for the replacement of the plant as it wears out, becomes old style or inefficient.

The productive center method of figuring costs on this necessary phase of the business is based on the valuation of the equipment necessary to do the work in that center.

Aside from the wages and the rent paid, there is no more important item in the figuring of costs than the value of the machinery and equipment. It is a sad fact that but few manufacturers, including printers, actually know the value of their plant, and yet they attempt to do business, figure costs, and say they are making money.

The basis of your business is the plant that

FIGURING THE INVENTORY 23

you have bought, and although you must have labor and a place in which to do business, yet you could not do without a plant to help produce.

As you have figured your pay roll and rent according to the productive centers, you should also list the machinery and material of your plant according to these productive centers.

The three primary productive centers or departments of a printing office are composing room, press room and bindery. These with the business office are necessary to every printing plant, whether large or small. The office comes first on your summary sheet, and the value of the office furniture must be considered.

While the office is not a productive center, yet it is the means of securing the work, accounting for it, and taking care of the numerous details. Therefore, the office furniture should be considered an integral part of the plant and its equipment in the way of desks, filing cabinets, safes, typewriters, account books, etc., must all be listed.

The composing room is a single productive center, but may be sub-divided into several parts,

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although usually divided into hand and machine composition sub-divisions.

The press room can also be divided into several sub-divisions or centers, according to the size, style and cost of the presses.

The bindery is capable of a great many sub-divisions, from the simple one of the small shop that has a paper cutter, and does only such work as padding, folding, etc., to larger and more complicated plants.

The best method of taking an inventory is to have a well known and reliable appraisal company list your property for you. These men are trained in this work, and will do it in a manner which you could never hope to equal.

The important part, however, is to get a correct value on your plant. Your costs are based on the value of your plant, not what you actually paid for the material and then "depreciated" by some sort of mathematics, but the actual worth of the plant if you were to replace it today.

There is a great difference between an inventory and an appraisalment. An inventory is usually based upon the original cost of an article, and a high or low price may have been paid

for it—quite different from the market or going price of such an article. On the other hand, an appraisal is based upon what the article is worth to-day, and then depreciated according to style or type of article, its age and efficiency. There is at all times a junk value to an article, aside from its efficiency or productive value, and this, of course, must be taken into consideration.

In figuring a plant for cost purposes, many are led wrong by putting a low valuation upon machinery that was purchased at a very low price. If this has been the case, you should claim that profit for yourself; it was a bargain you drove for yourself, and it would be unwise to deprive yourself of a part of it, which would be the case if you put a low value on the machinery for cost purposes. You would lose just that much real money.

If it is not possible for you to secure the services of an appraisal company to list and value your plant, it will be necessary for you to do the best you can for yourself in the matter.

To do this properly, you should provide yourself with some blanks made for the purpose.

LEDGER INVENTORY

Form American Printers' Cost Committee.

DEPARTMENT

[illegible]

FIGURING THE INVENTORY 27

These blanks are $8\frac{1}{2} \times 14$, and punched to fit a loose leaf binder. A reproduction of the sheet is given, and extra sheets may be purchased from the United Typothetae of America, Chicago, Ill., or you can rule and print them yourself.

Arrange the sheets according to productive centers or departments and make additions from time to time.

A summary sheet of each center should be figured, listing in totals the various classes of equipment.

List each separate item for the office—the filing cabinet sections, the desks, books, chairs, tables, rugs, etc., must each be listed.

In the composing room, each series of type should be listed on a separate sheet. Cases, racks, cabinets, etc., should be all carefully described and on separate sheets also. This will allow for additions, and for easy checking.

In the press room list each press, with all the extras, on a single sheet, and if individual motors are used, the motor for that press should also be listed, including all wire connections, installation, etc.

The various sub-divisions of the bindery should

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each be listed separately, and kept that way for all future use.

As additions to the equipment are made they must be entered upon the equipment sheets and notated. Deductions can also be noted, and changes made in the inventory.

The correct way to take an appraisal is to have one person to list the entire plant, and sheets of paper about $5\frac{1}{2}$ x $8\frac{1}{2}$ inches padded 50 sheets to the pad should be provided for the purpose. Starting from some well defined point, every conceivable thing must be set down—every extra bolt, screw-driver, nail, belting—let no small item escape notice. List the small things first—the big ones last.

Do not list over eight items on one sheet, and then number and put away. Later they should be given to a second person to check over to see if they are correct and nothing left out. No attempt at prices should be made.

These sheets are then assorted and listed by somebody who writes a plain, legible hand, or it may be done on the typewriter. Compare these carefully again with the slips, to see that nothing has been omitted.

FIGURING THE INVENTORY 29

The pricing comes next, and if possible, secure the assistance of a well posted printers' supply salesman. The majority of them will be only too glad to help you, and their employers will sanction anything of this kind, as they know the value of an inventory or appraisal for obtaining costs.

There are often questions arising as to what equipment is to be included in a productive center, as for instance, where one article is used in several divisions, such as chases and sectional blocks. As in each case they are a necessary part of the composing room in order that the type and plates can be sent to press, these should be put in the composing room equipment.

The cutter in the bindery is often a problem where forwarders, the regular stockman and rulers all use it. Usually the split pay roll method is used, creating a cutting division or department and each man's salary charged to it. The best and easiest way is to figure the problem carefully and divide either the time or the equipment according to the needs.

It is impossible to anticipate each point that might arise in a plant, but the safe plan is to

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charge each productive center with the equipment made necessary by either the starting or the actual production of the work in that center.

But, above all, have a correct listing of your plant, one as near right as man can make it, divided as to productive centers, listed in such a manner that changes may be easily made—either additions or deductions.

QUESTIONS

1. *What is a prime necessity in a manufacturing business?*
2. *Is it necessary in order to understand costs to know the value of your plant?*
3. *If so, why?*
4. *How should your plant be listed?*
5. *The office is not a productive center; how about that?*
6. *What are the usual productive centers in a printing plant?*
7. *Can there be sub-divisions?*

FIGURING THE INVENTORY 31

8. *What kind of a value should be placed on your plant?*
9. *What method should be pursued to ascertain the value of your plant?*
10. *How are additions or deductions made?*
11. *State possible conflixtions as to centers and how they should be equalized?*

IV

FIGURING REPLACEMENT VALUES

The man who fails to take into account the possible wearing out or depreciation of his machinery through new inventions, deterioration or disuse, will some day find himself with a plant consisting of junk and the new man just starting in able to beat him in the race for business.

These are competitive days in the business world, and the man who does not keep up the youth of his plant must fall behind. This one factor has been overlooked by many manufacturers, and they have failed to allow a replacement charge as a general expense item in conducting their business.

Many have figured "overhead," which is a mythical sum liable to mean much, or again very little. This was generally supposed to carry a load to cover various items; but replacement is not an "overhead"; it is a positive, distinct and important item of costs.

It is not related to depreciation—a thing never really depreciates entirely. There is always some value left. Replacement is a positive thing, and if it is considered that the productive life of a machine will be ten years, then an amount equal to one-tenth the value of the machine must be charged as a direct cost to each productive center.

As stated, a machine never depreciates to the point of losing all value. It has always a junk value, and many times will do as effective work twenty or thirty years after its purchase. The old hand scythe will still cut grain, but the farmer wants a modern harvester, the very latest model. So with any machinery the latest only will do, and a plant must always be kept young.

Figuring a replacement value on each productive center means that each year one-tenth of the value is either laid aside in actual money, or that amount of new material is put in to keep the plant young.

That you may see the difference between depreciating 10% per year, and replacement of 10% per year, I give two tables presenting the

TEN PER CENT. REPLACEMENT DEDUCTED FROM ORIGINAL INVESTMENT

Year	Investment	%	Repl'c'm't	Balance
1	1000 00	10	100 00	900 00
2	900 00	"	100 00	800 00
3	800 00	"	100 00	700 00
4	700 00	"	100 00	600 00
5	600 00	"	100 00	500 00
6	500 00	"	100 00	400 00
7	400 00	"	100 00	300 00
8	300 00	"	100 00	200 00
9	200 00	"	100 00	100 00
10	100 00	"	100 00	00

TEN PER CENT. DEPRECIATION DEDUCTED FROM BALANCES

Year	Investment	%	Depreciation	Balance	Year	Investment	%	Depreciation	Balance
1	1000 00	10	100 00	900 00	50	5 71	10	57	5 14
2	900 00	"	90 00	810 00	51	5 14	"	51	4 63
3	810 00	"	81 00	729 00	52	4 63	"	46	4 17
4	729 00	"	72 90	656 10	53	4 17	"	42	3 75
5	656 10	"	65 61	590 49	54	3 75	"	37	3 38
6	590 49	"	59 05	531 44	55	3 38	"	34	3 04
7	531 44	"	53 14	478 30	56	3 04	"	30	2 74
8	478 30	"	47 83	430 47	57	2 74	"	27	2 47
9	430 47	"	43 05	387 42	58	2 47	"	25	2 22
10	387 42	"	38 74	348 68	59	2 22	"	22	2 00
11	348 68	"	34 87	313 81	60	2 00	"	20	1 80
12	313 81	"	31 38	282 43	61	1 80	"	18	1 62
13	282 43	"	28 24	254 19	62	1 62	"	16	1 46
14	254 19	"	25 42	228 77	63	1 46	"	15	1 31
15	228 77	"	22 88	205 89	64	1 31	"	13	1 18
16	205 89	"	20 59	185 30	65	1 18	"	12	1 06
17	185 30	"	18 53	166 77	66	1 06	"	11	95
18	166 77	"	16 68	150 09	67	95	"	10	85
19	150 09	"	15 01	135 08	68	85	"	09	76
20	135 08	"	13 51	121 57	69	76	"	08	68
21	121 57	"	12 16	109 41	70	68	"	07	61
22	109 41	"	10 94	98 47	71	61	"	06	55
23	98 47	"	9 85	88 62	72	55	"	05	50
24	88 62	"	8 86	79 76	73	50	"	05	45
25	79 76	"	7 98	71 78	74	45	"	05	40
26	71 78	"	7 18	64 60	75	40	"	04	36
27	64 60	"	6 46	58 14	76	36	"	04	32
28	58 14	"	5 81	52 33	77	32	"	03	29
29	52 33	"	5 23	47 10	78	29	"	03	26
30	47 10	"	4 71	42 39	79	26	"	03	23
31	42 39	"	4 24	38 15	80	23	"	02	21
32	38 15	"	3 82	34 33	81	21	"	02	19
33	34 33	"	3 43	30 90	82	19	"	02	17
34	30 90	"	3 09	27 81	83	17	"	02	15
35	27 81	"	2 78	25 03	84	15	"	02	13
36	25 03	"	2 50	22 53	85	13	"	01	12
37	22 53	"	2 25	20 28	86	12	"	01	11
38	20 28	"	2 03	18 25	87	11	"	01	10
39	18 25	"	1 83	16 42	88	10	"	01	09
40	16 42	"	1 64	14 78	89	09	"	01	08
41	14 78	"	1 48	13 30	90	08	"	01	07
42	13 30	"	1 33	11 97	91	07	"	01	06
43	11 97	"	1 20	10 77	92	06	"	01	05
44	10 77	"	1 08	9 69	93	05	"	01	04
45	9 69	"	97	8 72	94	04	"	01	03
46	8 72	"	87	7 85	95	03	"	01	02
47	7 85	"	79	7 06	96	02	"	01	01
48	7 06	"	71	6 35	97	01	"	01	00
49	6 35	"	64	5 71					

difference. Table No. 1 shows how \$1,000 is replaced in ten years, as should be figured in all manufacturing plants.

Table No. 2 is not absolutely correct, but shows that by figuring 10% from the balances, or depreciating, the machinery would not be entirely depreciated until 97 years, an impossible time. As a matter of fact, if decimals are used, there would still be some left after 1,000 years. You could never depreciate it entirely, there will always be something left.

The two tables, however, show quite clearly the difference between the methods of replacement and depreciation.

The inventory is figured by productive centers, and the replacement must also be figured in each productive center.

In the method for figuring floor space, a small office was shown, and for an example in figuring replacement, we will use the equipment as shown there.

The office furniture is valued at \$251.65; the composing room at \$1,246.32; the job presses at \$941.84; the cylinder press at \$1,502.85, and the bindery at \$651.84, totalled as follows:

Office	\$ 251.65
Composing Room	1246.32
Job Presses	941.84
Cylinder	1502.85
Bindery	651.84
<hr/>	
Total	\$4594.50

The plant is worth \$4,594.50 and one-tenth per year would be \$459.45. This amount must be allowed each year as a replacement fund.

As the summary of costs must be figured each month, this amount should be divided by twelve, as follows:

$$\begin{array}{r}
 12 \overline{) 459.45} \quad (38.29 \\
 \underline{36} \\
 99 \\
 \underline{96} \\
 34 \\
 \underline{24} \\
 105 \\
 \underline{98} \\
 \hline
 \end{array}$$

The amount of the replacement each month is therefore \$38.29. This must be divided among the productive centers according to the value of each center.

REPLACEMENT VALUES 37

For easy figuring each amount is reduced to \$50 units as follows:

<i>Center</i>	<i>Value</i>	<i>\$50 units of value</i>
Office	\$ 251.65	= 5
*Composing	1246.32	= 25
Job Press	941.84	= 19
Cylinder	1502.85	= 30
Bindery	651.84	= 13
		<hr/>
Total		92

To get the units, divide the total value of a center by 50, eliminating the cents, as follows:

$$\begin{array}{r}
 50) *1246 (24.46/50 \\
 \underline{100} \\
 246 \\
 \underline{200} \\
 46
 \end{array}$$

The 46 being greater than one-half, it is counted as a whole unit. If the fraction is less than one-half it is disregarded.

The total of 92 units represents the value of the plant. The replacement value is \$38.29, and this is divided by 92 units to ascertain the value of each unit.

* The composing center value is used as an example for obtaining \$50 units.

$$92)38.29(.42$$

$$\underline{368}$$

$$149$$

$$\underline{92}$$

$$57$$

The result is 42 cents replacement for each unit. As the total units are 92, and each unit represents 42 cents, it is an easy matter to figure the replacement for each productive center, by multiplying the units of each separate center by the value as follows:

<i>Department</i>	<i>Units</i>	<i>Value</i>	<i>Amount</i>
Office	5	$\times 42¢$	= \$ 2.10
Composition	25	$\times 42¢$	= 10.50
Job Press	19	$\times 42¢$	= 7.98
Cylinder	30	$\times 42¢$	= 12.60
Bindery	13	$\times 42¢$	= 5.46
<hr/>			
			\$38.64

The table is not correct, as 42 cents was not the exact amount. The balance was 57, but instead of carrying out further decimals, it was counted as one; 57 from 92 leaves 35—the exact amount we have more than the actual replacement value, as shown:

REPLACEMENT VALUES

39

Figured	\$38.64
Actual amount	38.29
	<hr/>
	.35

In order that the figures may come out exactly, this amount is deducted from one or more of the productive centers—usually those that have the least work, or are idle. In this plant the cylinder press is the least productive, so the amount is deducted from that center, and we find that our replacement values figure as follows:

<i>Center</i>	<i>Amounts</i>
Office	\$ 2.10
Composing	10.50
Job Press	7.98
Cylinder	12.25
Bindery	5.46
	<hr/>
Total	\$38.29

It makes no difference how many centers there are, two or a hundred, they may all be figured in the same way.

In some centers, more than 10% should be figured, for instance—type. This wears out rapidly, especially in exclusive job shops, and 25% should be figured. As 10% is already

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figured, all that is necessary is to figure one-twelfth of 15% of the value of the type in addition, which will give you the result.

QUESTIONS

1. *Why should replacement be figured?*
2. *Is not replacement "overhead"?*
3. *What is depreciation?*
4. *Are replacement and depreciation the same?*
5. *How should they be figured?*
6. *What amount is generally figured as replacement per year on machinery?*
7. *How is the yearly amount reduced to a monthly sum?*
8. *Why is a \$50 unit the value used?*
9. *Give an example of reducing an amount to \$50 units.*
10. *Having the units, how do you figure the replacement value of the unit?*

- 11. How are the replacement values applied to the several productive centers?*
- 12. Should balances be ignored or figured in?*
- 13. How is extra replacement in excess of 10% to be taken care of?*
- 14. How many productive centers may be figured this way?*
- 15. Give an example.*

V

FIGURING INTEREST ON INVESTMENT, INSURANCE AND TAXES

An investor expects a return on his money. He not only wants to see what his money has bought, but wants a small and just amount at a given period for the use of the money.

In figuring replacement, we have taken care that the value of the investment shall always remain at par; but it is not enough to keep the investment intact, a dividend must be realized on it.

It does not matter if the investment is clear of incumbrance or not—a return must be made—and this is doubly important if there is a mortgage or notes to be paid, as the interest must be met, and how meet it except as a matter of cost?

A distinction must be made between capital and investment. Interest cannot be figured on the mere working capital. In some cases it may be more than the investment, in others less. You cannot figure interest on “good-will” as the return from this should come from the profits.

INTEREST ON INVESTMENT 43

You cannot figure interest on copyrights, exclusive control, and other values of a like nature. Profits must take care of all these. The actual amount in dollars and cents invested in equipment and material, should bear an interest item as a part of the cost.

You must be sure of the interest on your investment in materials, and the only way to be sure is to figure that in your costs; as profits are elusive—cost a certainty.

Interest on investments, insurance and taxes, all have a close relationship. You pay for your insurance according to the amount of machinery or material you have in your plant. The rate is fixed, and you pay as much as necessary to fully protect your investment. Taxes are levied on the amount of your investment, in direct proportion to what you list.

These three items being of a similar nature, can all be figured in exactly the same way. On form 9-H interest on investment is distributed on one line, and insurance and taxes on another. The Denham and other methods combine these three and replacement, calling it "Plant Investment Expense," grouping them together, and

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making one distribution. I prefer this latter method as being more simple and more easily understood.

First we will figure interest as a single item, and then insurance and taxes, and later on take up the group method.

We have figured the value of the plant at \$4,594.50. Using 6% as interest on investment, which is the average rate in the East (7 and 8% should be used in the West), we find that the return on this item should be \$275.67 per year, thus:

$$\begin{array}{r} \$4594.50 \\ \underline{6\%} \\ \$275.67 \end{array}$$

This will amount to \$22.97 per month, when figured as follows:

$$\begin{array}{r} 12)275.67(22.97\frac{1}{4} \\ \underline{24} \\ 35 \\ \underline{24} \\ 116 \\ \underline{108} \\ 87 \\ \underline{84} \\ 3 \end{array}$$

INTEREST ON INVESTMENT 45

When 6% is used there is a more simple method by taking $\frac{1}{2}$ of 1% as follows:

$$\begin{array}{r} \$4594.50 \\ .005 \\ \hline \$22.97250 \end{array}$$

Referring to where we figured the replacement fund, we find that the plant contains 92 units of value, so the interest cost per unit is 25 cents minus, as shown below:

$$\begin{array}{r} 92)22.97(.25- \\ 184 \\ \hline 457 \\ 460 \\ \hline \end{array}$$

We therefore distribute the total interest on investment (\$22.97) as follows:

<i>Center</i>	<i>Units *</i>	<i>Value</i>	<i>Amount</i>
Office	5*	$\times 25\text{¢} =$	\$1.25
Composition	25	$\times 25\text{¢} =$	6.25
Job Press	19	$\times 25\text{¢} =$	4.75
Cylinder	30	$\times 25\text{¢} =$	7.50
Bindery	13	$\times 25\text{¢} =$	3.25
			\$23.00

* See figuring replacement values on page 37.

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This leaves a balance of 3 cents difference over the actual amount. The 3 cents may be deducted from the bindery item, making it \$3.22, and this change will make the balance correct.

Insurance and taxes are figured exactly the same way.

Insurance at \$2.50 per hundred on \$4000.00 would be \$100.00 per year. Taxes would be about \$35.00 per year.

Insurance	\$100.00
Taxes	35.00
	<hr/>
	\$135.00

This is the annual cost. To get the average monthly cost, divide by 12, which amounts to \$11.25 as follows:

$$\begin{array}{r} 12 \overline{)135.00} (11.25 \\ \underline{12} \\ 15 \\ \underline{12} \\ 30 \\ \underline{24} \\ 60 \\ \underline{60} \end{array}$$

INTEREST ON INVESTMENT 47

To get the unit of value cost, this amount is divided by 92, the result being 12.2 cents as follows:

$$\begin{array}{r}
 92 \overline{) 11.250 (122} \\
 \underline{92} \\
 205 \\
 \underline{184} \\
 210 \\
 \underline{184} \\
 26
 \end{array}$$

This amount is then distributed to the different centers as follows:

<i>Center</i>	<i>Unit</i>	<i>Value</i>	<i>Amount</i>
Office	5	$\times 12.2\phi =$	\$.61
Composition	25	$\times 12.2\phi =$	3.05
Job Press	19	$\times 12.2\phi =$	2.31
Cylinder	30	$\times 12.2\phi =$	3.66
Bindery	13	$\times 12.2\phi =$	1.58
<hr/>			
\$11.21			

This is not quite correct, as 12.2 cents is not exact. There is a difference of 14 cents. This may be equally divided among the various centers so as to make the amount exact.

I strongly recommend that Insurance and Taxes be not averaged and figured thus every

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month. For the first two or three summaries this is very good, but after that these items should be figured only when they are paid, or entered on the books. In this way the system may be made to balance exactly all ledger and journal accounts.

The group method of figuring is the simplest method, as all four items are figured at once, saving a great deal of work, and is just as accurate, if not more so than any other.

The several items are as follows:

Replacement	\$38.29
Interest on investment	22.97
Insurance	8.33
Taxes	2.92
	<hr/>
Total	\$72.51

The unit value of this amount would be 78.8 cents as follows:

$$\begin{array}{r}
 92)72510(788 \\
 \underline{644} \\
 811 \\
 \underline{736} \\
 750 \\
 \underline{736} \\
 14
 \end{array}$$

This amount is distributed as follows:

<i>Center</i>	<i>Unit</i>	<i>Value</i>	<i>Amount</i>
Office	5	$\times 78.8\text{¢} =$	\$ 3.94
Composition	25	$\times 78.8\text{¢} =$	19.70
Job Press	19	$\times 78.8\text{¢} =$	14.97
Cylinder	30	$\times 78.8\text{¢} =$	23.64
Bindery	13	$\times 78.8\text{¢} =$	10.24
			\$72.49

Again we do not get the exact amount, as the division showed a balance of 14 cents. We show a difference of 2 cents. This amount may be added to the busiest department, as being more easily absorbed.

It will be seen that this method makes the problem quite simple, and it is just one of the many things that are coming up and helping to simplify the cost problem.

It must be understood that the monthly amount should be figured according to the rules laid down previously.

We have taken care of a few of the "stickers" in the way of figuring costs, but there are a few other problems just as hard to understand, yet as easy to figure when fully explained. The basis of all being to charge direct to each center,

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its just and due proportion of expense that can be safely figured as belonging to that center. Having once accomplished this, and having the production of that center in hours or other results, the problem of costs is in a fair way to be solved.

QUESTIONS

1. *Is it necessary to figure interest on investment?*
2. *Upon what basis should it be figured—upon that of capital or actual investment?*
3. *How about profits?*
4. *How do you arrive at a fair interest rate?*
5. *Upon what basis is this distributed to the various centers?*
6. *Is there a relation between "interest on investment" and "insurance and taxes"?*
7. *How are they distributed among the productive centers?*

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8. *Should insurance and taxes be averaged each month, or is there a better way?*
9. *What is the "group method" of distributing expense to centers?*
10. *Give an example.*
11. *What is the true basis of cost?*

VI

FIGURING POWER

Nothing illustrates quite so well the principle of the productive center being the correct one for ascertaining costs, as the method of figuring the cost of power. The unit is the productive center, and this unit must bear all the burden of every direct cost. For that reason power is always figured as an absolute direct cost against each productive center.

Power is either purchased in the form of electricity from a distributing point, or manufactured by a gasoline or gas engine, steam power or otherwise, on the premises. In any case the cost of this power can be easily found and charged direct to each productive center.

Where power is purchased in the form of electricity there are three ways in which the cost can be charged to each productive center, and each of these will be described, using as a basis the equipment as shown in figuring the floor space.

The plan is reprinted on the following page for easy reference.

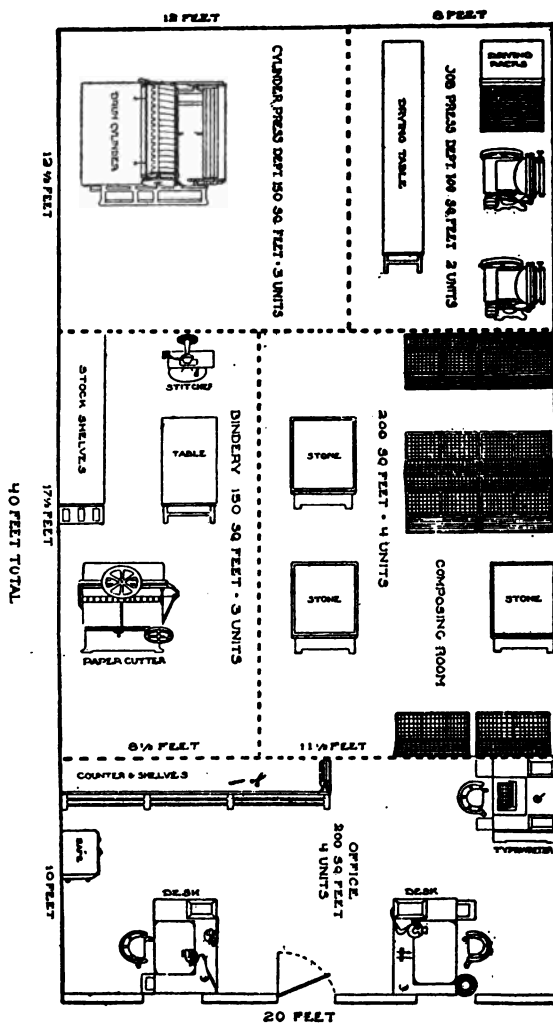
There are three departments that consume power in the plant, viz., bindery, job press and cylinder press. In the bindery, a four h.p. motor is attached to the paper cutter, and a one-eighth h.p. motor to the stitcher. The job presses each have a one-half h.p., and a three h.p. motor drives the cylinder.

The most correct way to ascertain the cost of power for each of these is by installing a system of wiring so that each productive center shall be on a different meter. At the end of each month, the meters will record the amount of electricity consumed in each center, and it is then an easy matter to charge the center with the cost of the electricity used.

This method, while the very best, is quite expensive, and requires as stated, special wiring, and while somewhat in use, is not done to any great extent.

A method that was used when the productive center costs were first figured was distributing the cost of the power according to the horsepower (h.p.) size of the motors used in each center.

HOW TO FIGURE COSTS



VIEW TAKEN FROM THIS POINT

The motors in the centers are as follows with totals of the h.p. for each:

Bindery—Cutter	4 h. p.	
Stitcher	$\frac{1}{8}$ h. p.	
		<hr/>
Total	$4\frac{1}{8}$ h. p.	
Job Press—Press No. 1 ..	$\frac{1}{2}$ h. p.	
Press No. 2 ..	$\frac{1}{2}$ h. p.	1
Cylinder		3
		<hr/>
Total	$8\frac{1}{8}$ h. p.	

In order to make easy figuring, the unit method is again adopted, and either one-quarter or one-eighth h.p. is considered a unit. As we have a one-eighth quantity, and the h.p. is low, that amount will be considered a unit. One-fourth h.p. should be used for larger plants. By this method we get the following result:

<i>Productive Center</i>	<i>H. P.</i>	<i>Units of</i> $\frac{1}{8}$ h.p.
Bindery	$4\frac{1}{8}$	= 33
Job Press	1	= 8
Cylinder	3	= 24
		<hr/>
Total		65

The total bill for power to run this plant for one month amounted to \$13.00 and the cost was

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found by dividing the total units of h.p. into the amount thus:

$$\begin{array}{r} 65 \overline{)13.00(.20} \\ \underline{13\ 0} \\ 0 \end{array}$$

Each unit of h.p. cost 20 cents, and we then multiply the units of each center by this amount, and the result is as follows:

<i>Productive Center</i>	<i>Unit</i>	<i>Cost</i>	<i>Totals</i>
Bindery	33	$\times 20\text{¢} =$	\$6.60
Job Press	8	$\times 20\text{¢} =$	1.60
Cylinder Press	24	$\times 20\text{¢} =$	4.80
			<hr/>
Total			\$13.00

This method was soon found unsatisfactory, if not unjust, and a better one had to be found. A careful analysis of just the one simple proposition can be easily found.

Every printer knows that the cutter and stitcher in a small shop are infrequently used, and therefore charging that productive center for power according to the size of the motor is not correct. The same is true of the cylinder press, which runs only once or twice a month for

three or four hours, in a small shop. The same principle holds good in a larger plant, where various machines may have large motors, but are used infrequently.

It was necessary to find some other way to figure the cost. The meter system was not practical on account of expense, so that was eliminated.

The matter was decided in the simplest way imaginable, and the problem solved about like this:

If a 4 h.p. motor runs 40 hours during a month, why not multiply the hours that it ran by its size, and ascertain the h.p. hours? Easy. The motor ran 40 hours, the size is 4 h.p., therefore it ran 4 times 40 or 160 h.p. hours. The problem was solved. On this basis, let us see how the plant would figure out.

The cutter as an example, we will say, ran 32 hours in one month, the stitcher 16 hours, one job press 160 hours, the other 85 hours, and the cylinder 24 hours.

Multiply these various hours by the size of the motors, and you get the following results:

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<i>Machines</i>	<i>Hrs. Run</i>	<i>Size of Motor</i>	<i>H. P. Hrs.</i>
Cutter	32	× 4	= 128
Stitcher	16	× $\frac{1}{8}$	= 2
Job Press No. 1..	160	× $\frac{1}{2}$	= 80
Job Press No. 2..	85	× $\frac{1}{2}$	= 43
Cylinder	24	× 3	= 72
<hr/>			
Total			325

By centers the result would be as follows:

Bindery—Cutter	128
Stitcher	2
<hr/>	
Total	130
Job Press—Press No. 1.....	80
Press No. 2.....	43
<hr/>	
Total	123
Cylinder	72
<hr/>	
Total	325

Each center is thus figured, and the total h.p. hours of the various machines are charged as a cost to each center. The cost of the power was \$13.00, and this is distributed to the various centers by dividing this amount by the total h.p. hours, thus:

$$\begin{array}{r} 325) \$13.00(4 \\ \underline{13\ 00} \\ 0 \end{array}$$

The result being a cost of 4 cents per h.p. hour, each center is charged on this basis, as follows:

<i>Center</i>	<i>H.P. Hours</i>	<i>Cost</i>	<i>Totals</i>
Bindery	130	× 4¢ =	\$5.20
Job Press	123	× 4¢ =	4.92
Cylinder	72	× 4¢ =	2.88
Total			<u>\$13.00</u>

By comparing the above with the result of figuring the size of the motors only, the correctness of the last method may be easily seen. The job presses are charged with a larger proportion of the power, because they are used more; the cylinder with less, because it is used less. This method is fast being adopted as a standard one by all cost experts using the productive center method of ascertaining costs. The flexibility and justness can easily be seen by the examples shown.

One almost wonders why power was thrown into a general hopper called "overhead," and tacked by percentages onto labor, material or something else, none of which had anything to do with the amount of power consumed or not consumed. The direct cost method, the pro-

ductive center idea, shows up more surely as correct, as each item of cost is analyzed.

When power is manufactured by a gas or gasoline engine, or steam engine, it is just as easy to figure as when purchased like electricity. Instead of a bill once a month, there are many little items for gasoline, oils, rent of space occupied, repairs, depreciation, interest on investment, cost of labor of supervision, etc.

The sum of these make up the cost, and the total each month is distributed to the productive centers as shown above.

The following will give a good idea of how to figure cost of a privately owned power plant, the amounts being purely estimated, and the total brought to the same figure as used before for example purposes only:

	<i>Cost per Month</i>
Rent for space occupied by engine. . . .	\$ 2.00
Fuel used	4.50
Oils, waste, etc. . . . .	.50
Repairs	1.00
Labor	1.00
Int. on investment, replacement, etc. . .	4.00
	<hr/>
	\$13.00

To secure the power basis for each machine, the manufacturer will gladly send the information.

Cost of running shafting can be figured individually, or ignored as an item, and each machine will bear its burden according to the hours run.

There are methods where testing machines as to the h.p. required (with and without load) can be used and various other ideas, but when figured out the result is so very little different from the h.p. basis, that it is a waste of time.

It must be remembered that in each case the running time, exclusive of make-ready of each machine is used as a basis for figuring the h.p. hours.

QUESTIONS

1. *In what way is power figured?*
2. *In how many different ways may power be secured?*
3. *In how many ways can power be figured when purchased direct?*

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4. *How may meters be used?*
5. *What was the first method used in figuring cost of power to productive centers?*
6. *Give an example.*
7. *Was this method found satisfactory?*
8. *Why?*
9. *What is h.p. hour?*
10. *Give an example of figuring h.p. hours.*
11. *Distribute cost to productive centers on the above basis.*
12. *Are there other methods?*
13. *Can cost of privately manufactured power be found by productive centers?*
14. *Give example.*

VII

FIGURING LIGHT, TOILET AND ELEVATOR EXPENSE

Of all the expenses that enter into the cost of production, possibly these three have had the least attention of any other items. The small plant paid but little attention to them, as the combined cost of the three is very small, yet they constitute a factor, and however small, must be taken into account when figuring costs.

LIGHT—In a small office, or when the cost of light is less than \$50.00 a month, this can be very easily figured as a general expense, and will receive its final distribution to the various productive centers when that expense is taken care of.

When light costs more than \$50.00 a month, and runs into a considerable sum, a careful record should be kept of the amount used in the various divisions—including the office.

For example, we will assume that the cylin-

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der press-room has done considerable overtime, that the daylight was not good and that a great deal of electricity in the form of light was consumed. The other general productive centers may not have used very much, and therefore should not bear the burden of the increased cost of light.

The foreman of each department should send in a report each day of the number of lamps and the number of hours they were used. A press-room has forty lamps of 40-watt consumption per hour. Only twenty of these may be used, or perhaps 35. It is a simple matter for him to report as to the consumption, and a blank modeled on the following lines will be found admirable for the purpose.

Productive Center	
Date	191....
No. lamps used.....Size.....Watts....	
No. hours turned on	
Signed	
	Foreman.

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The cost clerk can keep the record of the lights used in the office in the same manner. At the end of the month, these slips may be tabulated by multiplying the number of lamps by the size or watt, and the product by the number of hours they were in use. The following example will illustrate the point:

The center during the day used 52 lights for four hours, and the size of the lights were 40 watts, and the result is 8320 watts consumed, as follows:

$$\begin{array}{r} 52 \text{ lights} \\ 4 \text{ hours used} \\ \hline 208 \text{ total hours} \\ 40 \text{ size of light} \\ \hline 8320 \text{ total watt consumption.} \end{array}$$

These are figured every day and totaled at the end of the month. Assuming that this amount was an average for 26 working days, the result would be:

$$\begin{array}{r} 8320 \text{ watts} \\ 26 \text{ days} \\ \hline 49920 \\ 16640 \\ \hline 216,320 \text{ total watts} \end{array}$$

Electricity is sold by the kilowatt, and 1000 watts make a kilowatt. There were then 216 kilowatts consumed, which at 10 cents per kilowatt, would amount to \$21.60. All the centers can be figured in a like manner. This, however, is not absolutely correct. The only correct way is to install an individual meter in each center.

Where arc lights are used, the electric company would gladly furnish the information as to the watt consumption.

There are many other ways of figuring light, as on the basis of the number of lights in each center, the sold hours, pay roll hours, etc.

Unless, however, the light item is a big factor, the *best method* is to charge it as an office expense and thus distribute to the centers.

TOILET—In large plants this is quite an item of expense and the only proper method is to distribute the cost to each productive center according to the average number of persons in each center. The rent, water rate, supplies, soap, etc., should all be figured, and the total per person in the plant found, including the office force, and each center be charged with the proportion. The following table shows the method:

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Rent	\$18.00
Water Rate	4.60
Soap and Towels	8.50
Supplies	2.50
Repairs	14.50
Plumbing Ex.	3.50

Total\$51.60

The number of persons employed in the plant are as follows:

Office Force	26
Composing Room	164
Press Room	214
Bindery	241

Total 645

The total expense being \$51.60 and 645 persons, the cost per person is 8 cents as follows:

$$\begin{array}{r} 645 \overline{) 51.60} \quad 8 \\ \underline{5160} \end{array}$$

The cost is then distributed to the centers and office as follows:

	<i>No. of persons</i>	<i>Cost</i>	<i>Totals</i>
Office	26	$\times 8\text{¢} =$	\$ 2.08
Composing Room	164	$\times 8\text{¢} =$	13.12
Press Room	214	$\times 8\text{¢} =$	17.12
Bindery	241	$\times 8\text{¢} =$	19.28
<hr/>			
			\$51.60

In small plants the item of toilet expense can be considered a direct office cost, and this will later be absorbed by the various centers.

ELEVATOR—In the greater number of plants elevator service is part of the rent, and does not need consideration. In large plants it is quite an item, and must be considered individually.

The freight elevator is used almost entirely for handling stock, and the entire cost of running this elevator should be charged to stock handling.

There may be some argument here as to where the item of delivery to shipping room comes in; but all this can come under the cost of stock handling, and should be so figured. The cost of stock handling will be considered later.

The cost of the passenger elevator and its method of distribution depends entirely upon the conditions of the building. If the office is on the ground floor, then the cost should be distributed to the centers according to the full number of employees. If the offices are located on the second or third floors, then they should bear the greater portion of the expense, as it will be used a greater percentage of the time for busi-

ness purposes. The cost of the elevator must be governed by circumstances, and carefully analyzed before a decision is made as to the correct method.

There are a great many plants that have several branches or departments, such as publications, directory departments, salesroom, etc. A careful tab should be kept in each of these of the elevator service, and each charged with a just proportion of the cost of maintaining and running the elevators.

The usual items of cost are—power, repairs, inspection, elevator operator, greases and oils, and a liberal allowance for depreciation and interest on investment, as well as its proportion of rent according to the floor space it occupies.

Those having special elevator problems should submit them for consideration and advice.

QUESTIONS

1. *What plants are most effected by the cost of light, toilet and elevator expense?*
2. *What is the minimum cost for light that should not be considered as an individual item?*

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3. *State how light consumption by productive centers may be reported.*
4. *Should the consumption of light in the office be reported? By whom?*
5. *How is the amount of light used to be figured?*
6. *Give an example.*
7. *How should toilet expense in large plants be figured?*
8. *Give an example.*
9. *To what should the cost of running a freight elevator be charged?*
10. *What is the difficulty in figuring the cost of the passenger elevator?*
11. *State how you would figure it.*

VIII

FIGURING DIRECT DEPARTMENT EXPENSES, SPOILAGE AND STOCK HANDLING

Each productive center carries with it small items of expense that are wholly incidental to that center. In every case they should be made a direct charge and become a part of the cost of operating that center.

The true theory of cost is charging to each item every direct cost, and not by guesswork. In the productive center method every item of cost can be traced directly, and nothing left to be added by any method of calculation by percentage based on something else. It is the direct method of debiting and crediting each center with what it costs and what it produces.

The items of direct expense that can be traced directly to each center are numerous, and the items in each plant differ from those of other plants, but the common items are enumerated, and the cost clerk should be careful to secure all

the items of expense that can be charged directly to the centers.

COMPOSITION—The small expense items in this center are proof paper, twine, benzine, ink, brayers, brushes, rags, lye, etc. When machines are used, you will have gas, supplies, oils, metal waste (about 1% each time it is melted), paper and water (if monotypes) and repairs.

In the Press Rooms there are rollers, benzine, guage pins, tympan paper, smut sheets, oil, rags, repairs and other supplies. Ink should never be figured as a productive center cost, but always as a direct cost on the job, the same as paper stock.

In the Bindery there are knife grinding, cutting sticks, gas, wire for stitcher, glue, paste, thread, folders, ink, alcohol and cleaning blankets for ruling machines, repairs and supplies. Gold should be a direct charge to the productive center that handles the finishing of books, etc.

No one thing is of more importance than getting all these small items into the cost of the productive center. The bookkeeper should give the cost clerk a full accounting of all these small

items, so that they may be charged correctly. Especially is this true of repairs, which may be quite an item.

SPOILED WORK is an incident to all printing plants, big or little. Too many, however, consider only the cost of the stock. The cost of production up to the point where the error occurred should be considered a part of the charge. A spoiled work ticket should be made to cover the job, entered upon the books of the company, and figured into the costs. A great many thousands of dollars have been lost to the printers of the country through failure to consider this important item. Printers who think they do not have it should wake up.

Spoiled work may be considered a direct expense and charged to the center making the error, so that the cost may be borne directly as an item of cost to that center. This theory is good, and one that should be carried out, but it is not always easy to locate the origin of the error. Every man will prove an "alibi" if possible, and lay the blame onto some one else. A great many errors are due to wrong instruction from the office, and as all the centers combined

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must finally bear the cost of the entire business, unless the spoiled work can readily be traced to a particular center, the cost of it should be entered as an office expense. In nine cases out of ten, spoiled work will have to be taken care of in this manner, and in the smaller plants this is the most practical way.

An excellent way to provide for this is to figure in your costs a fixed sum each month to take care of this—say $\frac{1}{2}$ of 1% of your total business. A special ledger account may be carried to cover this, and all spoiled work be debited to this account. This is a safe method, and will prove successful in keeping an accurate account of this big item of cost and leakage.

Another excellent idea is to provide a special ruled columnal book in which the bookkeeper may classify all direct expenses, so that the cost clerk may have them at hand when the time comes to figure the costs for the month.

STOCK STORAGE AND HANDLING

Until the productive-center method of figuring costs was devised, the cost of handling stock or storage was never considered.

The general method is to charge 10% for handling, but this, like all percentage methods, does not give true costs. It certainly costs as much to handle 1000 lbs. of five-cent paper as it does to handle 1000 lbs. of ten-cent paper. At any rate, it does not cost twice as much for the latter as the former.

You cannot argue as to waste, spoilage, chances of loss, etc. These are all provided for in other ways, and not in the cost of handling.

Form 9-H of the Standard System provides that all the rent, labor and expenses of handling and storage of stock should be totaled and added to the office expense. Thus it becomes a direct charge on the various hour costs of all the productive centers.

In the smaller shops the handling of stock is usually figured into the bindery, as the work is usually done there or near the paper cutter, and it simplifies matters to so arrange it.

In larger plants, however, considerable space and labor are expended in the handling, storage and delivery of stock.

If you desire to know just how much it costs you to handle stock, create this into a semi-pro-

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ductive center. Charge it with such items as rental, insurance, taxes, labor, office and incidental expenses, etc., as may be proper. When this result is obtained, you can ascertain costs in one of two methods.

As it has been suggested to add 10% to paper for handling, you might wish to prove the correctness of this theory. Having determined the total cost, you have merely to ascertain from the bookkeeper the amount of your purchases in paper for the month; and the rest is easy.

For example, you find that it has cost you \$375.46 per month for rent, insurance, taxes, depreciation, etc., to run a productive center for stock handling, and that you have expended \$3,254.65 on paper. You will find that the cost of handling the stock amounts to 11½% as follows:

$$\begin{array}{r}
 3254.65)375.4600(.115 \\
 \underline{325465} \\
 499950 \\
 \underline{325465} \\
 1744850 \\
 \underline{1627325} \\
 117525
 \end{array}$$

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If you are not satisfied with this result, you can find out the cost per pound to handle your stock. This method requires a little more labor, but is far more accurate, as already stated. A pound of paper is a pound, and it seems absurd to charge more for handling one pound than another. You will have to ascertain the total number of pounds of paper purchased during the month; the weight of the envelopes may also be added.

For example—It has cost you \$375.46 to conduct your stockhandling center, and you have found by careful calculation that 74,487 pounds of paper were purchased during the month, and that it has cost you .005 per pound to handle it:

$$\begin{array}{r}
 74487)375.460(.005+ \\
 \underline{372\ 435} \\
 25
 \end{array}$$

This is a trifle over $\frac{1}{2}$ c per pound. If 1000 lbs. of paper are used, it would cost you, upon that basis, \$5.00 to handle same, three-cent, ten-cent or twenty-cent paper. This is the most accurate way, but is a little more laborious because it is

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necessary to ascertain the number of pounds of paper purchased during the month.

QUESTIONS

1. *Are there items of expense that can be charged directly to a productive center?*
2. *Is the theory of finding the cost by direct charges correct?*
3. *Does this method apply to productive center methods?*
4. *Give a list of direct expenses in various centers.*
5. *Give a list of those not included in this article.*
6. *Who should furnish a list of direct expenses?*
7. *Do you have any spoiled work?*
8. *Whose fault is it?*
9. *How should spoiled work be charged?*

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10. *Does it cost money to handle stock?*
11. *Which is the more accurate method—to charge a percentage or a direct price per pound?*

IX

FIGURING FOREMEN AND SUPERINTENDENTS' SALARIES

The theory of a foreman is that he should oversee and direct the efforts of a number of men who are employed at a given task. He is not supposed to do any of the actual work, but to superintend it.

Many small plants, however, have "working foremen," who not only direct the work of others, but do a good share of it themselves.

In the matter of figuring the foreman's salary, or rather of distributing his salary against each productive center, you have two separate ideas—one, that of a "directing foreman" and the other a "working foreman," and each needs different treatment in the adjustment of salary.

The "directing foreman," as explained in the first paragraph, directs the efforts of a number of men at a given task. The man under him, who receives higher rate of wages, does so be-

cause the foreman finds that he need not direct the efforts of this workman as much as he does those of the others; and the lowest paid man is the one who requires the greatest supervision.

In most instances, the foreman directs the work in more than one productive center; for instance—in the press room with job and cylinder presses, or a bindery that has been subdivided into several productive centers. The foreman is a non-producer, but plays the highly important part of “director”—and his salary must be borne by the various productive centers of which he has charge.

His work is clearly with the individual, irrespective of the wage paid, and therefore the salary of the foreman cannot be distributed to the various productive centers according to the wages paid the various employees. This would be unjust to the man who is paid a high wage because he requires but little supervision, and would be clearly favoring the cheap employee who requires considerable supervision.

The productive center that employs the greatest number of people will need the most directing, and the one with few people will require less.

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Reasoning the situation out clearly, the salary of the foreman should be distributed according to the number of hours employees have worked in the various productive centers. Not chargeable hours, but actual pay-roll hours of the employees. To use the chargeable hours would not be just as the non-chargeable time needs as much directing as the chargeable.

Referring back to figuring the pay roll (see page 8) you will note that the actual pay-roll time of every employee has been totaled for each productive center. Thus the number of hours put in by employees in each of the productive centers can be easily totaled, as follows:

	<i>Composition</i>	<i>Cylinder Press</i>	<i>Job Press</i>	<i>Bindery</i>
John Richards.	224:00			
Chas. Edmunds.		54:15	112:45	57:30
R. R. Hicks.	214:45			
Total for Depts.	438:45	54:15	112:45	57:30

Thus we find that there are 663:15 pay-roll hours as follows:

Composition	438:45
Cylinder Press	54:15
Job Press	112:45
Bindery	57:30
Total	663:15 hours

The foreman's salary is \$182.60 and this divided by 663 $\frac{1}{4}$ hrs. will amount to 20¢ an hour which is then divided on that basis to the productive centers as follows:

	<i>Hours</i>	<i>Rate</i>	
Composition	438:45	$\times 20\phi =$	\$87.75
Cylinder Press	54:15	$\times 20\phi =$	10.85
Job Press	112:45	$\times 20\phi =$	22.55
Bindery	57:30	$\times 20\phi =$	11.45
<hr/>			
Total			\$182.60

Each center by this method has charged to it a just proportion of the foreman's salary, according to the amount of directing the center requires. A center that is comparatively idle needs very little directing, and the busy center needs more. Each center will be charged only as its needs demand.

The salary of the working foreman is taken much in the same way, except he will keep a time report and all non-chargeable time will be credited to directing, and this amount distributed among the various productive centers in his charge.

There may be some question, however, as to the time of a working foreman in the composing

room who does distributing. The cost clerk will have to look out for this very carefully, and separate the directing time from the time actually spent in a productive center. A great deal of diplomacy and tact must be used when the working foreman is a member of the firm. By carefully making out time reports, and calling the attention of the foreman to the need of correct time, the desired result may be accomplished. But it will require persistent effort to do it. It is a sad commentary upon business men that they are particular about the accounting of every dollar, but lose track of the golden hours that bring in the dollars, and see but little need of accounting for them.

Where a superintendent is employed to take the management of a plant, and is in charge of several foremen, his salary should be charged equally to the various foremen, each foreman to be considered as a unit. The superintendent or manager handles the business through the foremen, and they should be charged with his salary.

This is, no doubt, a new idea on the subject, but when analyzed it may be clearly seen that it

is a very logical way to distribute the superintendent's salary. As the foreman directs those under him, so does the superintendent direct the foremen under him.

Should there be five foremen in a plant, and the superintendent's salary \$250.00 a month, one-fifth is added to the wage of every foreman as follows:

<i>Foreman</i>	<i>Salary</i>		<i>Supt. Salary</i>		<i>Total</i>
John Osborn	\$126.50	+	\$50	=	\$176.50
Richard Johns	134.75	+	50	=	184.75
Geo. C. Robinson . . .	115.00	+	50	=	165.00
Oscar Nelson	132.50	+	50	=	182.50
Henry Vance	154.65	+	50	=	204.65

These totals are then carried to the various productive centers of which the foremen have charge on the basis of the pay-roll hours, exactly as described before.

QUESTIONS

1. *What is a foreman?*
2. *How many kinds are there?*
3. *Should the higher paid employee bear a larger portion of the foreman's salary for directing?*

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4. *Can a foreman direct in more than one productive center?*
5. *What productive center should be charged with most of the foreman's salary?*
6. *What is a pay-roll hour?*
7. *How can this be used to distribute the foreman's salary?*
8. *How is the "working" foreman's salary distributed?*
9. *What is the main difficulty in the time of a "working" foreman?*
10. *How should a superintendent's salary be divided?*
11. *Why?*

X

FIGURING SELLING EXPENSE

If you were to ask the average printer what his selling expenses were, he would look at you in wonderment and probably say that he did not have any except his solicitor.

Yet every printer, however small, has some selling expense, and the list of the items that make up this expense is considerably more than the amount paid to a solicitor.

The following items are a few of those that go to make up the selling expense:

Salesmen and solicitors' salaries

Commissions for Orders

Traveling Expenses

Car Fares

Advertising

Telephone and Tolls

Telegrams

Discounts to Customers

Deductions to Customers

Bad Accounts

Donations and Charity

Organization Dues

Office Stationery

Postage

Being a good Fellow

Perhaps there are more. All these are closely related to your sales, and must be considered a selling expense. Each will, upon careful analysis, be found a true selling expense.

Salesmen and Solicitors' Salaries—There is no question but that these are selling expenses, especially if they are working on a straight salary and not upon a percentage basis.

Commissions for Orders—This item should be figured into selling costs as a lump item, especially with the idea of one order being a leader to many. If commissions are given occasionally, this is correct. If, however, all your salesmen, solicitors, etc., are absolutely on a commission basis, then these two items must not be figured into costs, but the commission added as a direct cost to each job or item from which the salesman derives a monetary return. The only correct method of handling this proposition is to obtain

a factory cost, and then add the commission. This should be handled very carefully, and not attempted except upon expert advice, when all the circumstances have been fully taken into account. The average plant, however, does not do business in that way, and hence all salesmen's costs should enter directly into the productive costs.

Traveling Expenses—These are almost always related to sales, and are a selling expense.

Car Fare—This is mostly street car fare, and large orders often mean many trips. Small orders will mean few. This is clearly a selling expense.

Advertising—No one will question this as a selling expense, and if the advertising is produced and mailed from your own plant, the full cost of this advertising must be charged. Do not make the mistake of thinking that your own printing costs you nothing. Charge into selling expense the full cost just as you would if you were producing it for someone else. No greater loss has there been than this one, especially to printers. The merchant and manufacturer has to pay you for his advertising matter, which en-

ters into his cost of doing business and because you do it for yourself does not eliminate the value of it, and why should you not figure it into your cost of doing business?

Discounts to Customers—Many give discounts, and take discounts, and foolishly try to balance one with the other. You give a discount not only for prompt payment, but to win trade, to sell your goods. Every discount you give is a selling expense, and should be figured into your costs.

Deductions—The same argument in relation to discounts holds good with deductions to customers. You give them to hold business, as a means of securing a future order. Thus they become a selling expense.

Bad Accounts—Uncollectable accounts are held down to a certain percentage of your sales. They are an incident of your selling.

Donations and Charity—Often called “hold-ups” are usually given because of a pull, that may result in either getting business, or loss of business. They are a selling expense, and usually held down to a certain percentage of sales.

Organization Dues—These are usually based

on the amount of business done, and hence have a direct relation to sales.

Office Stationery and Postage—A necessity, but almost entirely used to produce sales, or the necessary correspondence before, during or after the production of work.

Telephone, Tolls, Telegrams, etc.—These modern necessities are used almost exclusively in the promotion of sales, and are clearly a selling expense. How often are they used for anything beside the actual business connected with either a possible order, or an order in the house? They facilitate selling, and are a selling expense.

Being a Good Fellow—Last but not least are the hundred and one small costs of getting on the right side of a customer, treating him right and holding his business. And the customer must pay—who else should?

These are the general selling items, and must be figured into the cost of your production.

There are two ways in which they can be figured into costs, a great deal depending upon the size of the plant and method of doing business.

For a small plant all these items may be safely figured into the "office" expense, and then distributed to the various centers, as will be described later. This method is advised for the medium and small plants, as the method to be described later will make but very little if any difference in the hour costs in their plants.

The plant doing a business of \$20,000 a year or more, however, has a very much larger selling expense, enters into more productive centers, and it would be unfair to charge the selling expense as absolutely a direct office cost, to be taken care of later.

Selling expense is based on total sales, and therefore each center should bear as a selling expense its just burden according to the sales of each center.

The easiest and most correct method is to figure the basis of your cost on sales without profit or loss (which are always a percentage of cost) and then distribute the selling cost on that result.

For example, we will say that the selling cost of a plant is \$52.41, and is to be distributed to the composing room, cylinder and job presses

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and bindery. If there were more centers, the principle would still be the same.

The composing room produced 264 chargeable hours, the cylinder press 51, the job press 106, and the bindery 56. The basis upon which the production of this plant sold its product was \$1.20 an hour for composition, \$1.50 an hour for cylinder press, 80 cents an hour for jobbers, and 80 cents an hour for binding. Either profit or loss on work was a percentage of the total cost as based on these rates.

In other words, they were the extension values that are used in figuring the cost of work and as a basis of selling. Therefore the selling cost may be safely distributed to the various productive centers on a basis of this cost, which is the chargeable hours multiplied by the extension rates. The result is as follows:

<i>Department</i>	<i>Chargeable Hrs.</i>		<i>Extension Rate</i>		<i>Values</i>
Comp. Room	265	×	\$1.20	=	\$318.00
Cylinder Press	51	×	1.50	=	76.50
Job Press	106	×	.80	=	84.80
Binding	56	×	.80	=	44.80
					<hr/>
					\$524.10

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The total selling expense is \$52.41, and the sales are \$524.10, which is 10% as follows:

$$\begin{array}{r} 524.10)52.410(10\% \\ \underline{52\ 410} \end{array}$$

The various centers will therefore receive 10% of the selling expense, based on the extended values of their chargeable hours as follows:

<i>Department</i>	<i>Extended Values</i>		<i>Percent of Sales</i>		<i>Totals</i>
Composing Room	\$318.00	×	10%	=	\$31.80
Cylinder Press	76.50	×	10%	=	7.65
Job Press	84.80	×	10%	=	8.48
Bindery	44.80	×	10%	=	4.48
					<hr/>
					\$52.41

This method simply, accurately and positively charges to each center a due proportion of the selling expense, based on the total sales for the month of each productive center. They are made a direct charge, and only according to the sales. A center that produces very little should be charged with little selling expense, while the center that produces the most should bear the greater burden.

QUESTIONS

1. *Has a printer any selling expense?*
2. *What is selling expense?*
3. *Describe the items and tell why they are a selling expense.*
4. *How should commissions be handled?*
5. *What two ways are advisable in which to distribute cost of selling?*
6. *Upon what is cost of selling usually based?*
7. *How can this be applied to printing?*
8. *What is an extension rate?*
9. *Show how selling expense can be distributed on extension values.*

XI

FIGURING ADMINISTRATION EXPENSES AND COMMERCIAL INVESTMENT

One, in figuring costs, almost reaches the belief that "Things that are not—is." So many elements enter into the figuring, and can be traced to cost, that never were put into the "general expense" account, and each is so vital to commercial success that no wonder "labor costs" only were thought of in the early days of cost finding. Usually a lump sum of 25% or 33 1-3% was supposed to cover the "expense of doing business," and then let go at that. But many a concern went broke on that principle, and the cost student dived deeper for the reason.

Having figured rent, interest and replacement, insurance and taxes, power, light, direct expenses, wages, selling expenses, you would think that should complete the list, but there are still other items of cost that are at times ignored, yet must be figured out if the business is to be a commercial success.

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One of these items is executive salaries, or to call it by a less high-sounding name, the boss's salary. Few proprietors think of their own salaries, yet they are a part of the cost of conducting the plant, and the proprietor is entitled to a salary for his efforts, and a profit besides. He must secure a living, and to assure it he must figure it into his costs.

This is but one of the administrative expenses of a business. The others are bookkeepers, cost clerks, stenographers, office, messenger and delivery boys, office supplies, books of account, etc. These in a large plant amount to quite a sum, and should be figured as a direct office expense, and distributed to the various centers, as will be explained in the next article.

Not all of the money necessary to conduct a plant is invested in machinery and office furniture or equipment alone. Of the total capital invested in a plant, perhaps only three-quarters and often only one-half is thus invested.

Too often men start in business thinking they need only a building, machinery, etc., and are then ready to start. This is not a start in the business world on the proper basis, and very

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soon the individual wakes up to the fact that credit plays a big part, and he will need money for running expenses, or credit to carry him along until he can secure a return in money on work done.

The well-managed concern always has a working balance, and does not hesitate to secure a loan, so that the working balance will be at hand in case it is needed. It requires money to pay interest, and if a printer does not pay interest on borrowed money, he would have to use his own money, and in that case is just as much entitled to interest himself as the bank would be had it loaned him money.

Now this in the business world is called "commercial investment," and is meant to take care of the money invested in the business other than in equipment. It makes no difference if the money has to be borrowed to take care of this (and in more than one-half the cases this is true) or the proprietor has that much surplus invested—it must bring a return. It is used to secure a reasonable return on the amount of money invested.

In order to guarantee a sure and safe return

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of this money, it is necessary to figure it into the cost of the business. To neglect to do so, may mean commercial failure. There are some who say this should come out of the profits; but you are taking a chance on a possible profit, whereas there is no chance connected with costs.

The general items in commercial investment are:

- Interest on Cash and Bank Balances
- Interest on Accounts Receivable
- Interest on Work in Process
- Interest on Paper Stock and Merchandise
- Federal and Corporation Taxes

The first item may startle you, but most banks require a certain balance to secure accommodations, and this is money invested in your business.

The accounts you have outstanding represent money expended in their production, and you are not enjoying the use of that money, which you might invest elsewhere and secure interest on same. If your customers wish to be carried, they must pay for the privilege, and it is wise to make sure of receiving it, so the interest on

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the monthly balance of accounts receivable is figured into your costs. This means at 6% the sum of $\frac{1}{2}$ of 1% on the showing of your books the last of the month.

The work begun, but as yet incomplete, has tied up a lot of your money. It is in the nature of accounts receivable, but does not appear on your ledger. With a cost system, it is but the work of a few minutes to go through your job record sheets, add up all the time and material charged to unfinished work, and figure $\frac{1}{2}$ of 1% of same into your commercial investment expense.

Money invested in a stock of paper or other merchandise awaiting a purchaser is entitled to interest on the amount invested as well as for any other purpose. In the large cities, the average printer carries very little paper or merchandise that his unfinished work would not cover. In the inland towns, however, the situation is different, and considerable paper must be carried to meet the demands of the trade. On this the proprietor must get a return on the money invested. A perpetual inventory can be easily kept, and the average balance at the end

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of the month will give the proper amount to figure.

If you pay Federal or Corporation Taxes, these should be figured as a commercial investment expense.

Many believe that if you owe any money on open account, this should be deducted from the total, as you are not paying interest on that money, and it is not your money you are using; therefore, you may not wish to figure interest on something you have not invested or borrowed from a bank, and are paying interest on. (See page 32.)

You can figure your commercial investment as follows:

Cash and Bank Balance	\$ 250.00
Accounts Receivable	560.00
Work in Process and Merchandise..	275.00
	<hr/>
	\$1085.00
Less Accounts and Bills Payable....	595.00
	<hr/>
	\$ 490.00
Interest at $\frac{1}{2}$ of 1%	2.45
Federal and Corporation Tax, $\frac{1}{12}$ of the whole amount50
	<hr/>
	\$ 2.95

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It is recognized that the fewer the accounts payable, the greater the amount to be figured for interest, as there will be a greater amount invested in the business.

The amount should be charged direct to office expense, except in extremely large plants, and then distributed on the basis of total departmental costs as explained later, but this, however, will not be necessary, except in a few instances.

QUESTIONS

1. *Have all the items of cost been figured in the general expense?*
2. *What are the usual expense items?*
3. *What item of expense is sometimes forgotten?*
4. *What are administrative expenses?*
5. *Is money invested only in equipment?*
6. *Why do many men start in business on a false basis?*
7. *Why commercial investment?*

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8. *What items should bring interest as a commercial investment?*
9. *Give your own opinion on the subject of outstanding accounts and unfinished work.*
10. *What about Accounts and Bills Payable?*
11. *Give an example of figuring commercial investment.*

SUMMARY OF COSTS BY PRODUCTIVE CENTERS

ITEMS	OFFICE	COMP.	CYL. PRESS	JOB PRESS	BINDERY	TOTAL
Plant Investment	\$251.65	\$1246.32	\$1502.85	\$941.84	\$651.84	\$4594.50
Floor Space (50 ft. units)	4	4	3	2	3	16
Power Basis			72	123	130	325
Pay Roll Hrs.		438.45	54.15	112.45	57.30	663.15
Chargeable Hrs.		265	51	106	56	478
Extension Rates		\$ 1.20	\$ 1.50	\$.80	\$.80	
Extension Values		318.00	76.50	84.80	44.80	524.10
*						
Pay Roll		\$ 208.18	\$ 21.70	\$ 45.10	\$ 23.00	\$ 297.98
Building Expense	\$ 8.00	8.00	6.00	4.00	6.00	33.00
Plant Inv. Exp.	3.94	19.72	23.64	14.97	10.24	72.51
Power			2.88	4.92	5.30	13.00
Selling Exp.	52.14					52.14
Office Salaries	62.00					62.00
Light	2.16					2.16
Spoiled Work	6.42					6.42
Direct Dept. Exp.		1.69	2.16	1.35	1.15	6.35
Com. Investment	2.95					2.95
Foreman's Salary		87.75	10.85	22.55	11.45	132.60
TOTALS	\$137.61	\$ 325.34	\$ 67.23	\$ 92.89	\$ 57.04	\$ 690.11

* All above this line are "statistics" on which are based the various amounts.

XII

FIGURING OFFICE EXPENSES

We have now come to the finishing touch of the Cost System. Every conceivable item of expense has been provided for, and each distributed and placed in its proper position and where its presence can be properly explained.

If you will go back to the previous articles, and place all the problems figured out,—with a very few exceptions that did not quite fit into the general plan and were given mainly as illustrations,—you will make out a sheet about like the one on the opposite page.

You can easily trace each item, and read back what each means, and after you total it all up, you will come to office expense and wonder what in the world you are to do with that \$137.61; and to tell you the truth, many others are still wondering the same thing. There are several ways in which it is possible to distribute this sum to the various productive centers, and with-

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out prejudice each method will be shown and carefully analyzed with examples showing methods of figuring and results.

SOLD HOUR METHOD—This method is the distribution of office expense to the various centers according to the number of sold (chargeable) hours to each productive center.

Argument—The sold hour represents the effort that has been put forth to produce. The center that has not produced should not be charged with any of the office expense. The sold hour is the unit of cost, and must bear the burden. It provides for elasticity, in that busy departments receive the greater portion of expense.

Example—There are in all 478 sold hours (or chargeable hours) and the office expense is \$137.61, and this divided by the sold hours gives the result of 29 cents per hour for office expense as follows:

$$\begin{array}{r} 478 \overline{) 137.61} \quad (29 \\ \underline{956} \\ 42.01 \\ \underline{43.02} \end{array}$$

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The office expense is then distributed to the productive centers as follows:

<i>Center</i>	<i>Sold Hrs.</i>	<i>Cost</i>		
Comp.	265	×	29¢	= \$76.85
Cyl. Press	51	×	29¢	= 14.79
Job Press	106	×	29¢	= 30.74
Bindery	56	×	29¢	= 16.24
				<hr/>
				\$138.62

This is \$1.01 in excess of the correct sum, as the cost is less than 29 cents. This amount is usually deducted from the centers doing the least work, and then added to the cost of the centers as follows:

	<i>Comp.</i>	<i>Cyl.</i>	<i>Job. P.</i>	<i>Bind'y</i>
Center Cost	\$325.34	\$67.23	\$ 92.89	\$57.04
Dist. Office Ex- pense	76.56*	14.79	30.74	15.52*
Total.....	\$401.90	\$82.02	\$123.63	\$72.56

Having thus distributed office expense to the productive centers, and added the direct center cost and office cost, you now have the total department costs, and it is only necessary to divide these costs by the sold hours to obtain the

* Nineteen cents is deducted from composition and seventy-two cents from the bindery to equalize office expenses.

N. B.--WHEN YOU CAN FILL OUT THIS SHEET PROPERLY YOU WILL KNOW THE COST OF PRODUCTION IN YOUR PLANT

STATEMENT OF COST OF PRODUCTION FOR MONTH OF 191

Standard Uniform Cost Finding Form, Form 100

Designed by American Institute of Cost Accountants

Use this sheet for all departments except the following (add columns as indicated)

ITEM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
	Pay Roll	Rent and Heat	Light	Power	Insurance and Taxes	Interest on Department Investment	Depreciation	Bad Debts	Spilled Work	Department Direct Expenses	Office Stationery and Postage	Total Stock Handling and Shipping	Total General Expenses	Total Department Cost without General Expense	Distribution of General Expense (Pro rated on basis of Department COST)	Total Cost of Departments	Chargeable Hours of Each Department	NET COST PER CHARGEABLE HOUR	Average Net Cost per Hour for	Percentage of Productive time	Pay Roll Cost per Chargeable Hour	Department Cost per Chargeable Hour										
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cost per sold hour of the various productive centers.

<i>Center</i>	<i>Total Cost</i>	<i>Sold Hrs.</i>	<i>Cost per hour</i>
Composition	\$401.90	÷ 265	= \$1.52
Cyl. Press	82.02	÷ 51	= 1.60
Job Press	123.63	÷ 106	= 1.17—
Bindery	72.56	÷ 56	= 1.29+

You have thus ascertained your real hour costs as shown by this method. For the small office this method is ideal and practical, and many larger shops believe it is more accurate.

However that may be,—and the writer's personal opinion is not considered,—there are other methods that the cost clerk should know, and we present them here. They are fully explained, and you may take your choice.

TOTAL DEPARTMENT COST—This is the Standard method, and the office expense is distributed on the basis of the total direct cost of each productive center. See Form 9-H on opposite page.

Argument—The direct cost of each of the centers are the factors of cost, and being such, office expense should be figured on that basis. The cost of an article for sale is ascertained, and "overhead" cost added to give the gross cost be-

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fore profit can be added. The direct center cost represents factory cost and office expense should be distributed to each center on that basis—the hour cost can then be found.

Example—The total cost of the centers are ascertained, and then the percentage of office cost to the productive center cost ascertained. The total center cost is \$542.50, and the office cost is \$137.61, which is 25% as follows:

$$\begin{array}{r}
 542.50)137.6100(25+ \\
 \underline{108\ 500} \\
 291\ 100 \\
 \underline{272\ 250} \\
 18\ 850
 \end{array}$$

The office expense is distributed according to this result as follows:

<i>Center</i>	<i>Cost of Center</i>		<i>Percent Office Exp.</i>		<i>Total Dep.</i>
Composition	\$325.34	÷	25%	=	\$81.33
Cyl. Press	67.23	÷	25%	=	16.81
Job Press	92.89	÷	25%	=	23.23
Bindery	57.04	÷	25%	=	14.26
					<u>\$135.63</u>

This is \$1.98 less than the office expense, which amount is added to the centers producing the most.

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These amounts are added to the direct center costs as follows:

	<i>Comp.</i>	<i>Cyl.</i>	<i>Job P.</i>	<i>Bind'y</i>
Direct Center Costs..	325.34	67.23	92.89	54.04
Dist. Office Exp.	82.33*	16.81	24.21*	14.26
Total	407.67	84.04	117.10	68.30

The sold-hour costs are then found by dividing the total center costs by the sold or chargeable hours as follows:

<i>Center</i>	<i>Total Cost</i>		<i>Sold Hrs.</i>	<i>Cost per hour</i>
Comp.	\$407.67	÷	265	= \$1.54 —
Cyl. Press	84.04	÷	51	= 1.64 +
Job Press	117.10	÷	106	= 1.10 +
Bindery	68.30	÷	56	= 1.21 +

This is the method adopted by the National Cost Congress and the U. T. A. and perhaps more universally used than any other. The general result in large offices is to reduce the bindery hand work, such as folding, and increase the cost of composition and cylinder press work.

EXTENSION VALUE—While both the sold-hour and department cost methods have strong advocates the theory of distributing office expense on

* One dollar is added to the composition and 98 cents to the job presses to equalize the cost.

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the basis of the extended values is being used as a compromise.

Argument—The office expense is largely created in making sales, and the sales are based on the value at which the product is sold, therefore the office expense should be distributed to the various centers, according to the extended values of the sold hours.

This is practically the method described in "Figuring Selling Expense," but for comparison the example of how this works out is given here:

Example—Refer to "Figuring Selling Expense" and the total value of the extended rates of the sold hours will be found to be \$524.10. The office expense is \$137.61, which is 26% as follows:

$$\begin{array}{r}
 524.10)137.610(26 + \\
 \underline{104\ 820} \\
 32\ 7900 \\
 \underline{31\ 4460} \\
 1\ 3440
 \end{array}$$

The office expense figured on this basis gives the result as follows:

FIGURING OFFICE EXPENSES 113

<i>Center</i>	<i>Ext. Values</i>	<i>Percent</i>	<i>Office Exp.</i>	<i>Totals.</i>
Comp.	\$318.00	÷	26%	= \$82.68
Cyl. Press..	76.50	÷	26%	= 19.89
Job Press..	84.80	÷	26%	= 22.05
Bindery ...	44.80	÷	26%	= 11.65
<hr/>				
				\$136.27

This is \$1.34 less than the exact sum, and this amount is added to the various centers to equalize the office expense.

The direct center costs and the office expenses are then added to get the total center costs and the result is as follows:

	<i>Comp.</i>	<i>Cyl. P.</i>	<i>Job. P.</i>	<i>Bind'y</i>
Direct Center Cost.	\$325.34	\$67.23	\$92.89	\$57.04
Dist. Office Exp....	83.68*	20.23*	22.05	11.65
<hr/>				
Total	\$409.02	\$87.46	\$114.94	\$68.69

The sold-hour costs are then found by dividing the total center costs by the sold or chargeable hours as follows:

<i>Center</i>	<i>Total Cost</i>	<i>Sold Hours</i>	<i>Cost per hr.</i>
Comp.	\$409.02	÷ 265	= \$1.54+
Cyl. Press .	87.46	÷ 51	= 1.71+
Job Press ..	114.94	÷ 106	= 1.09+
Bindery ...	68.69	÷ 56	= 1.22+

* One dollar is added to the composition and thirty-four cents to cylinder press to equalize the office expense.

These three methods are the ones most used, and to the cost student they present many interesting points. They are all presented without recommendation, as each is adaptable according to the plant and conditions.

Two other methods are as follows:

PAY ROLL—A few use the pay roll as a basis for distribution of office expenses, including foreman's salary, etc. The general principles of total direct center cost are used, except that the total pay roll of each center is the basis of distribution. Many plants have departments with piece workers, and this method is used in these cases.

PAY ROLL HOURS—The method used is the same as the sold hours, except the total pay roll hours of each center are used instead, otherwise there is no difference. The argument is that the non-chargeable time should bear a burden of the cost, and therefore the total pay roll hours is the most equitable and logical.

The writer has tried to present plainly each step in figuring costs by productive centers as it is done in a printing office. There is no rea-

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son why this same method could not be used in every class of manufacturing plant, with but slight changes.

The cost clerk, with the examples given here, should have no trouble in figuring the monthly summary of costs on Form 9-H or an adaptation.

However, the entire blank should be cross-added and proven to be correct before the result is accepted.

Remember, accuracy is the chief point in figuring costs. The future of a business is in your hands, it all depends upon your results, and an error may mean loss of business and complete failure.

QUESTIONS

1. *Can each item of expense be traced and charged against the right productive center?*
2. *What shall be done with the office expense?*
3. *What is the Sold Hour method?*
4. *Give an example.*

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5. *What is the Extension Value method?*
6. *Give an example.*
7. *What is the Standard method?*
8. *Give an example.*
9. *What is the Pay Roll method?*
10. *Where is this used?*
11. *What is the Pay Roll Hour method?*
12. *Wherein does it differ from the others?*
13. *What one thing is the most important to all cost keeping?*

XIII

ANSWERS TO QUESTIONS

There are any number of important questions that may arise in the figuring of costs, most of which apply to individual cases, or exceptional cases only. During the past few years many questions, some important, and others not so important, have been asked me, and I have felt that this book would be incomplete without adding to it answers to some of the most important questions asked in the past.

Advance proofs of this book have been sent to several critics, mainly to learn if anything important had been omitted. Attention was called to several minor matters, and some took exception to certain methods shown. I also can take exception to some given, but in most cases I have presented what was the latest method, and if possible two ways to figure a certain item, wherein either way would not make any great difference in the result.

The appended questions and answers must not

COST CALCULATOR

MINUTES										Wage per Week					HOURS									
5	10	15	20	25	30	35	40	45	50	55	60	1	2	3	4	5	6	7	8	9				
.03	.05	.08	.10	.13	.15	.18	.20	.23	.25	.28	.30	.60	.90	1.20	1.50	1.80	2.10	2.40	2.70					
.04	.07	.10	.14	.17	.20	.24	.27	.30	.34	.37	.40	.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60					
.05	.09	.13	.17	.21	.25	.30	.34	.38	.42	.46	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50					
.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	1.20	1.80	2.40	3.00	3.60	4.20	4.80	5.40					
.06	.12	.18	.24	.30	.35	.41	.47	.53	.59	.65	.71	1.40	2.10	2.80	3.50	4.20	4.90	5.60	6.30					
.07	.14	.20	.27	.34	.40	.47	.54	.60	.67	.74	.80	1.60	2.40	3.20	4.00	4.80	5.60	6.40	7.20					
.08	.15	.23	.30	.38	.45	.53	.60	.68	.75	.83	.90	1.80	2.70	3.60	4.50	5.40	6.30	7.20	8.10					
.09	.17	.25	.34	.42	.50	.59	.67	.75	.84	.92	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00					
.10	.19	.28	.37	.46	.55	.65	.74	.83	.92	1.01	1.10	2.20	3.30	4.40	5.50	6.60	7.70	8.80	9.90					
.10	.20	.30	.40	.50	.60	.70	.80	.90	1.00	1.10	1.20	2.40	3.60	4.80	6.00	7.20	8.40	9.60	10.80					
.11	.22	.33	.44	.55	.65	.76	.87	.98	1.09	1.20	1.30	2.60	3.90	5.20	6.50	7.80	9.10	10.40	11.70					
.12	.24	.35	.47	.59	.70	.82	.94	1.05	1.17	1.29	1.40	2.80	4.20	5.60	7.00	8.40	9.80	11.20	12.60					
.13	.25	.38	.50	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50					
.14	.27	.40	.54	.67	.80	.94	1.07	1.20	1.34	1.47	1.60	3.20	4.80	6.40	8.00	9.60	11.20	12.80	14.40					
.15	.29	.43	.57	.71	.85	1.00	1.14	1.28	1.42	1.56	1.70	3.40	5.10	6.80	8.50	10.20	11.90	13.60	15.30					
.15	.30	.45	.60	.75	.90	1.05	1.20	1.35	1.50	1.65	1.80	3.60	5.40	7.20	9.00	10.80	12.60	14.40	16.20					
.16	.32	.48	.64	.80	.95	1.11	1.27	1.43	1.59	1.74	1.90	3.80	5.70	7.60	9.50	11.40	13.30	15.20	17.10					
.17	.34	.50	.67	.84	1.00	1.17	1.34	1.50	1.67	1.83	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00					
.18	.35	.53	.70	.88	1.05	1.23	1.40	1.58	1.75	1.93	2.10	4.20	6.30	8.40	10.50	12.60	14.70	16.80	18.90					
.19	.37	.55	.74	.92	1.10	1.29	1.47	1.65	1.84	2.02	2.20	4.40	6.60	8.80	11.00	13.20	15.40	17.60	19.80					
.20	.39	.58	.77	.96	1.15	1.35	1.54	1.73	1.92	2.11	2.30	4.60	6.90	9.20	11.50	13.80	16.10	18.40	20.70					
.20	.40	.60	.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	4.80	7.20	9.60	12.00	14.40	16.80	19.20	21.60					
.21	.42	.63	.84	1.05	1.25	1.46	1.67	1.88	2.09	2.30	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	22.50					

For machine work add \$2.00 per week for each \$1,000 of the cost of the machine used.

be considered primarily a part of "How to Figure Costs," but rather a help to others in seeking light on certain problems that have arisen. I believe they will be a great help to the student of costs and to the cost clerk.

WAGES PLUS OVERHEAD TO SECURE COSTS

QUESTION—*I have been very much interested in the Cost Calculator issued by Mr. George Benedict of Chicago, where he uses wages as a basis of figuring hour costs. Some of my friends state that the results he shows are exceedingly accurate. Can I safely use this Calculator for my costs, and thus figure what I make or lose on my job work?*

M. O.

ANSWER—I want to say that Mr. Benedict deserves a great deal of praise in getting out the Cost Calculator of which you write. I am not an admirer of costs based on wages, but Mr. Benedict has added some new features, and his results in general coincide with those secured by the Standard and other productive center systems. But to use the figures given as a basis of cost, or instead of a cost system, without attempt-

ing to prove them correct as applied to your plant, is a pretty dangerous proceeding. I grant that you may not go far wrong, and possibly as a basis of figuring, the Calculator is a mighty good thing. It is a long ways better than using no method at all. You will have to accept, however, the figures given as true.

Mr. Benedict has based his figures on the proposition that the average *workman* produces but 40 hours a week, or rather, out of the total hours worked, but 40 are sold. This amount he has been able to arrive at by figures furnished from those operating productive center cost systems.

As a matter of fact several centers produce more than 40 hours a week for each workman, and others much less. The average, however, is nearly the amount given by Mr. Benedict.

The total expense of running a plant—less interest on investment and replacement—is found and this is compared with the total productive wages paid workmen. The surprising fact is that the amounts seem about even in nearly all plants. You can ascertain if this is true in your plant by adding up your general expenses and

then the wages paid and find the proportion. The following example will give you an idea as to how this should be done.

Productive wages		\$287.98
Rent, etc.	\$ 32.00	
Power	13.00	
Selling expense	52.14	
Light	2.16	
Spoiled work	6.42	
Dept. expenses	6.30	
Office salaries	62.00	
Commercial investment	2.95	
Foreman's salary	132.60	309.57
		<hr/>
Total expenses		\$597.55

Wages are 48% of the expense, as follows:

$$\begin{array}{r}
 597.55 \times 287.9800 (48\% \\
 \underline{239\ 020} \\
 48\ 9600 \\
 47\ 8040 \\
 \hline
 1\ 1560
 \end{array}$$

These figures are taken from the summary sheet on page 104 and show how closely wages and expenses are related. Nearly every printing office will be astonished as to how close the figures will come to being of equal amount.

On this basis of fact that the expenses are

nearly equal, Mr. Benedict doubled the wage of the workman, and divided the weekly wage by 40 hours, and thus got the cost hourly wage.

Example—A workman is paid \$10 a week. This amount plus the percentage of other expenses makes the wage \$20 a week. This amount divided by 40 hours gives the result as 50 cents per hour.

Therefore, a workman being paid the wage of \$10 a week, it actually costs 50 cents an hour for his time, but this is without his using a single piece of equipment of any nature. There is no interest on investment or replacement included in the amount whatever. How then is this amount cared for? Here is where Mr. Benedict is entitled to a great deal of credit. He has made up his table with the various wages paid, and by a simple method, the interest and replacement is taken care of by adding \$2.00 a week to the wage of each man, per \$1,000 worth of material or machine that he uses. And again the figures are astonishingly near correct, as an average.

A machine worth \$1,000 would be charged with \$60.00 interest a year, \$100 replacement, and about \$48 in taxes, repairs and other inci-

dentials amounting to \$208 a year, or for 52 weeks at the rate of \$4.00 a week. As the wages of the workman are doubled, thus by advancing the scale \$2.00 a week the \$4.00 a week for these items is taken care of.

The Cost Calculator is reproduced herewith, and by comparing with it the wages of a workman at \$18.00 a week operating a machine worth \$2,000, we find that the rate would be \$22.00 per week, or \$1.10 per hour. This is very close to the average costs as found throughout the United States.

Should, however, the productive time fall below that of 40 hours for each workman, then you would be selling your product at a loss.

Using any such system will not tell you what departments are costing you too much, or where your big losses may be. It is good only as an *average* condition, but is far from being absolutely accurate.

I am glad to answer this question, as there may be some misunderstanding in regard to what I have said about basing costs according to the wage paid workmen. As a matter of fact, the Cost Calculator may have to be changed in a few

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years, when results from the productive center cost systems show that it is not correct. The Calculator is based on results from productive center systems, and this is what proves it so nearly correct. Without this proof, however, the Calculator would not be of much value.

There is no disguising the fact that high wages are paid to men who operate large machines, using a large floor space, and generally in proportion to the wages paid. The cheapest help is in the bindery, where very little floor space per employee is used, and where a foreman supervises the work of a large number of people. This condition is what makes possible the seeming accuracy of the Calculator. The only place it may go wrong, is where there are varying wages paid in the same center, and an hour rate used there according to individual wages paid. This may lead to inconsistencies, and should be avoided. The proper way would be to average the wage paid, and thus find an hour cost.

Trouble may be found in the press center, where there are, say, four feeders and a pressman. Too low a cost may be gotten here, as the total productive hours of the five may not aver-

age 40 hours a week. I believe the wage of the pressman should be added to the wages of the feeders and then an hour cost found. If the pressman receives \$16.00 a week, and the feeders \$10.00 each, the pressman's wage should be divided among the feeders, thus making each \$14.00. This would give an hour cost of 70 cents, without investment, which is about \$500 per employee, making 5 cents an hour more, or 75 cents an hour. This is about the average hour cost on job presses, and proves the method to be about correct.

A great deal more could be written on this question, but enough is given here, so that you will understand the problem, and if desired, can figure out a means of using this method of figuring costs.

OUTSIDE WORK

QUESTION—Every printer has a greater or less amount of work he sends to someone else to do, and I claim that this ought to be handled in a separate department (or productive center). My plan has been to take the total of the bills paid for outside work, and treat them just as I

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do the known outlay for an interior department. I would be glad to hear from you in regard to this point.

C. F. C.

ANSWER—The purchase of outside work, such as binding, engraving, machine composition, etc., can be very easily treated as a separate productive center. The group method of figuring costs helps a great deal in this problem. If a storeroom is used, a certain portion of the rent may be charged to that productive center. Then the office and selling expenses can be prorated against that center and the others according to the amount of business done and goods purchased. For instance: Goods to the amount of \$1,000 were used during the month, and the cost of operating the mechanical productive centers was \$3,000, both will total \$4,000. If the total office and selling expenses were \$400, then one-fourth or \$100 would be charged against merchandise, and three-fourths or \$300 against the mechanical centers. This amount should be added to the cost of the merchandise by percentage or otherwise.

Form 9-H provides that all the cost of han-

dling stock shall be distributed against the hour costs. The other productive center methods do not do this, and usually create stock-handling centers, which is practically what is given above.

Should a stationery store be run in connection with a printing office, care must be exercised in separating the different items of expense in order that the store shall bear a just burden of the cost, otherwise it will show a big profit and the printing office a loss.

THAT LIGHT PROBLEM

QUESTION—*I do not believe that a productive center should be penalized with excessive cost for light, should it be located in a dark part of the building, as it is unfair. It is not possible for all the productive centers to have natural light, especially in the larger cities. Artificial light should be a general commercial expense, and then distributed to all the centers. I may be wrong, but would like your opinion.* E. S.

ANSWER—What we are trying to arrive at is cost. We may say it is not just to charge a certain center with so much floor space, or this machine with 6 h.p. and the other only 3 h.p.

But that does not alter the case if the center *does* occupy the space, and the machine *does* use the power. It is not a case of penalizing at all, but a case of charging to each center just exactly the expense that is evolved and made by that center. If the cost is high, that is up to the management. It would never do to try to cover up a leak by a method of figuring. The cost system is as much for discovering leaks as it is for finding an hour cost. If there is a high hour cost without efficiency, then there is a leak, and the business management should know of it.

By all means charge each center with all of its costs, and if loss there be, do not try to hide it by any method of distribution.

SUPERINTENDENCE ONCE MORE

QUESTION—*Your method of dividing the superintendent's salary according to the number of foremen does not seem to be right. Should not his salary be distributed according to the number of people in each center, or according to the number of pay-roll hours? To my mind this is the best and most practical way.* E. P.

ANSWER—You speak of “Your Method” when as a matter of fact it is not my method at all. The question of superintendence came up in a large plant some time ago, and several methods were discussed as to the right one to use. Finally careful tab was kept on the superintendent’s time, and it was decided that he gave about equal time to each of the foremen under him, and then his salary was added to that of the foremen pro-rata. The same proposition has come up several times, and when carefully analyzed this method was used.

Should you desire to use the pay roll method, or any other, I can see no objection. You will find that it makes little if any difference in the hour costs, whichever method you use. It does not pay to split hairs. Adopt a practical method, and then stick to it.

A NEWSPAPER-JOB SHOP COMBINATION

QUESTION—*Shall I create a separate center for my daily and weekly newspaper, and find out the cost in that way, or what method is the best to pursue?*

W. M.

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ANSWER—If your newspaper is conducted independently of the job plant, by another force of workmen, I would advise creating several productive centers, such as, machine composition, ad. composition, make-up, press, stereotyping, mailing, etc. Have a regular tracer made out each day and get the total cost for the paper each issue. This is the best way.

One publisher makes out a tracer for each ad. and gets the cost of setting each ad. separately. He then secures the cost of each issue of his paper without the cost of setting the ads. This has given him valuable data, and changed a great many notions he formerly had as to what to charge for his advertising.

Where there is a combination job and newspaper office, a regular ticket should be made out, and the cost of each issue of the paper ascertained. At first, several publishers used a separate center, and paid but very little attention to the paper, as they wanted the cost system principally for the job end. After a while they began to keep costs on each issue of the paper, and then discovered quite a few interesting things. This

is the only practical method and gives a great deal more information.

COST OF ADVERTISING

QUESTION—*How shall I find out what it costs for an inch of advertising in my paper?* L. A.

ANSWER—This is a very mooted question at the present time, but I believe the correct way is to figure the mechanical cost of the paper, as shown by a cost system, add to that the cost of patents or print paper, plates, special features, editors' and reporters' salaries, and other incidental items. These will give you gross cost of the paper.

Deduct from this the amount you receive each week from subscriptions, reading notices, and legals. This leaves a balance that the advertising must cover, if you are to get back what you put into the newspaper. Divide this amount by the number of inches of display advertising that you run, and the result will give you a flat cost per inch for your advertising.

This method has been conceded the most equitable, and was first adopted by the Cost Commit-

tee of the Minnesota Editorial Association. They publish a pamphlet on the subject, which you should secure. It is too long for reproduction here. The publishers of this book will gladly send you the pamphlet upon receipt of four cents in stamps to pay postage.

COMMERCIAL INVESTMENT

QUESTION—*I do not believe that Accounts Payable should be deducted from the items of commercial investment or working capital. Money owned by a business will be represented in one of four items, viz.:—plant investment, accounts receivable, work in process or merchandise. A condition is conceivable where the amount owed would exceed the total of the last three and a considerable portion of the first one, but that would not indicate that the capital was not there, and so not to be charged with interest. It merely indicates that the ownership of the business does not rest with the ostensible proprietor, but that his creditors' capital is being used to run the business. Most assuredly, he will be paying interest directly or indirectly, and the business must earn it, so that the whole capital*

involved without regard to liability should bear interest as part of the expense of doing business.

S. E.

ANSWER—I heartily agree with you, but some printers with super-sensitive minds want to be “honest” and hence figure out Accounts Payable. I believe they should not be deducted, and for the reasons that you state.

SELLING HOUR COSTS

QUESTION—*As the Extension Rates are used for the purpose of distributing or apportioning selling expense, which in turn, is computed on the basis of sales, should not they conform to the selling value of the chargeable hours as nearly as possible, particularly where differing rates of profit are computed on the various operations, or on merchandise, it being, of course, understood that the merchandise entering into the completed product bears its proper apportionment of the Selling Expense.*

A. E.

ANSWER—A great deal depends upon the method employed in figuring cost and selling

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price of finished jobs. If a definite selling price per hour is used, that amount should be used as an Extension Rate. If, on the other hand, the hour cost plus a profit by some fixed percent on the total cost is used, then that hour rate should be the Extension Rate. It is all a matter of method, and either would be perfectly correct. The merchandise proposition is answered elsewhere.

Blanks Do Not Make a Cost System

It is the actual, routine work, done in a systematic and practical way, that enables you to know, not only the time spent on a job, but its *exact cost to you* — shown on each job, based on the hour costs as figured at the end of each month.

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gives results in a simple manner for the small offices, and back of it are cost experts known the country over, who are ready to answer all questions to purchasers of the book, which contains not only the description of the system, but makes it possible for you to get the best expert advice on any point. These experts will be glad to answer questions and solve *your cost problems*. It is the ideal system for the country newspaper job printing office. This book is not sold as a "commercial" proposition, but in the belief that printers need more than mere forms, and are ready to pay part of the expense necessarily involved in answering questions and giving dependable information. It conforms to the *Standard* and other productive center systems, but more simple.

Price of book, with services, \$2.00.

Price of complete system, with blanks, summary book (will last three years), binders, etc., \$15.00.

MINNESOTA COST SYSTEM CO.

PUBLISHERS

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COST-SYSTEM BLANKS

The cost-system blanks recommended by the American Printers' Cost Commission are carried in stock by the United Typothetae and Franklin Clubs of America. Sample sets of the blanks will be sent free of charge to any address. Blanks in quantities may be had at the prices given in the table below:

FORM	DESCRIPTION	25	50	100	500	1000
1	Job envelope, printed.....	\$0.40	\$0.75	\$1.40	\$6.50	\$12.00
2	Individual job record, same as job envelope on one side; reverse is a complete record of the job.....	.25	.35	.60	2.75	5.00
3C	Compositor's time-ticket.....			.55	2.50	4.50
3P	Pressroom time-ticket.....			.55	2.50	4.50
3B	Bindery time-ticket.....			.55	2.50	4.50
4	Department pay-roll.....	.25	.35	.55	2.50	4.50
5	Monthly record, chargeable and non-chargeable hours (composin~room and bindery).....	.25	.35	.55	2.50	4.50
6	Monthly record, chargeable and non-chargeable hours, and impressions (pressroom).....	.25	.35	.55	2.50	4.50
9H	Statement of costs of production (small size).....	.25	.50	1.00	5.00	10.00
	Medium size.....	.90	1.50	2.75	12.75	27.50
	Large size.....	1.00	1.85	3.00	15.00	30.00

(a) An assortment of these blanks will be made up as follows: 200 Form 1; 200 Form 2; 200 each Form 3C, 3P, and 3B; 50 Form 4; 25 Form 5; 25 Form 6; 25 Form 9H; for \$7.50.

This is a complete outfit and will enable any printer to properly install the Standard Cost System.

(b) A larger assortment will be made up as follows: 500 Form 1; 500 Form 2; 500 each Form 3C, 3P, and 3B; 50 Form 4; 25 Form

5; 25 Form 6; 25 Form 9H; for \$16.50.

Electros of these forms will be furnished as follows: Form 1, \$2.25; Form 2, \$2.50; Forms 3B, 3C, 3P, (front and back complete,) each set \$2.50; Form 4, \$2.00; Form 5, \$2.00; Form 6, \$2.00; Form 9H, \$2.50. Complete set, \$20.00. Set of electros omitting 9H, 6, 5, and 4, \$11.50.

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